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GOLD COAST COLONY.

Report

ON THE

Medical and Sanitary Department

FOR THE FINANCIAL YEAR

1928–1929.

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GOLD COAST:
Printed by the Government Printer at the Government Printing Office, Accra.
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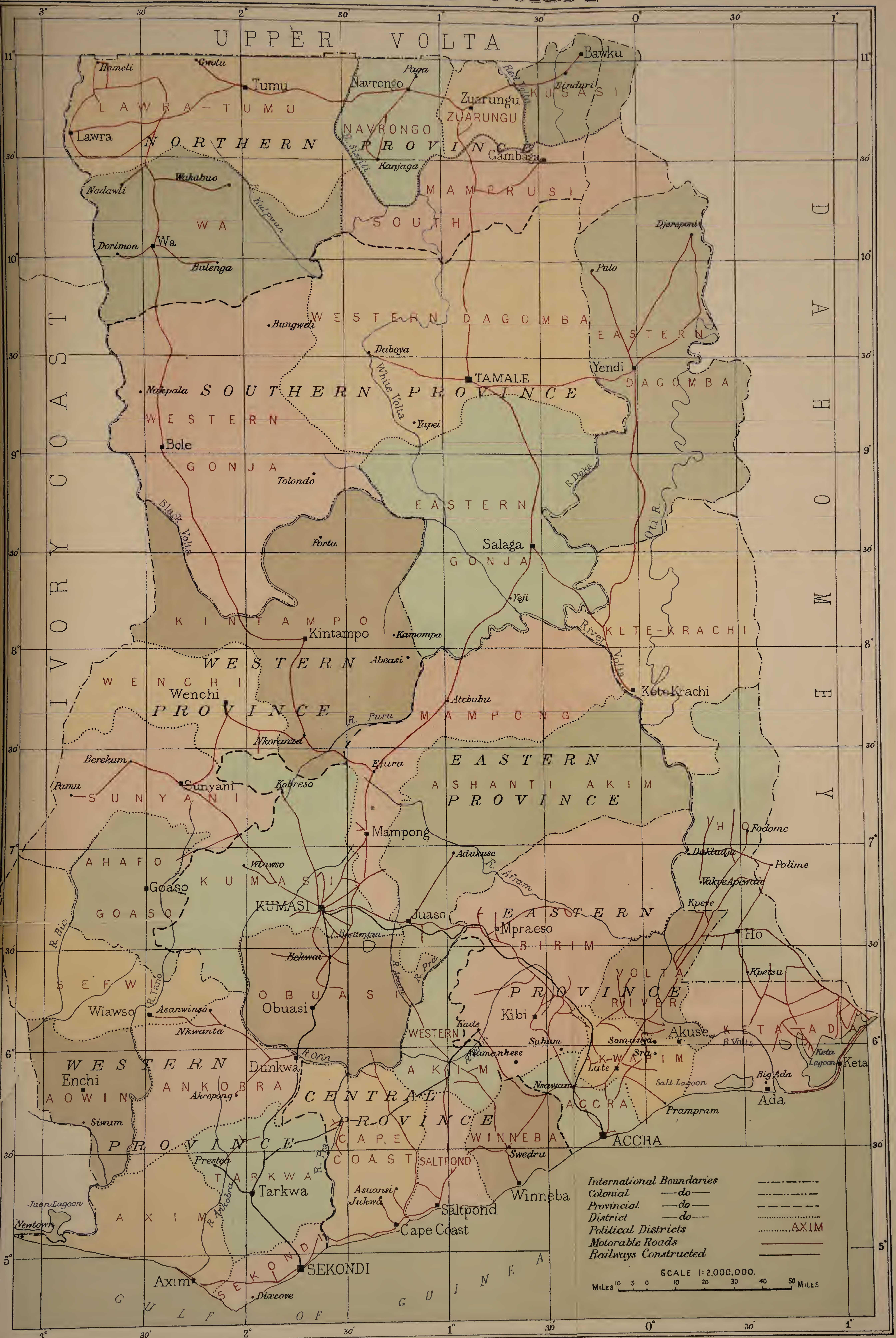

Survey H.Q. Accra, 1928

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Report on the Medical and Sanitary Department for the Financial Year 1928-1929.

I.—ADMINISTRATION—MEDICAL AND SANITATION.

(*a*) STAFF—EUROPEAN—MEDICAL.

Appointments, Transfers, Promotions, etc.

Promotions.

Dr. P. D. Oakley, Senior Medical Officer, was promoted Assistant Director of Medical Service on the 25th August 1928.

Miss H. F. Furley, Senior Nursing Sister, was promoted Matron, European Nursing Staff on the 27th November, 1928.

Appointments.

Dr. H. M. Boston was appointed Medical Officer, Achimota College, on the 25th April, 1928.

Drs. A. Reid, J. P. M. Donnelly, W. S. Thomas, G. C. Edwards and S. Batchelor were appointed Medical Officers during the year.

Mr. A. E. Oldfield was appointed Secretary to Director of Medical and Sanitary Service on the 31st October, 1928, a substitution for the former post of Office Assistant and Accountant.

Miss G. R. Mütton, Miss R. Lawford, Miss J. D. Veitch, Miss M. E. Howard, Miss N. M. Hilliard, Miss G. M. Evans, Miss D. E. Bird, Miss M. E. Phillips, Miss S. E. Audric, Miss N. E. Pearce, Miss E. M. Catton, Miss H. P. McLellan, Miss L. M. Shilling, Miss I. K. Young, Miss M. M. McCarthy, Miss C. G. Barchi, Miss M. E. Williams and Miss Peggy Stewart were appointed Nursing Sisters during the year.

Other changes in the Staff during the year:—Dr. W. I. Martyn-Clark was transferred from Nigeria on promotion as Senior Medical Officer on the 9th January, 1929.

Dr. F. W. Thompson, Medical Officer, had his appointment terminated on the 27th October, 1928.

Dr. T. V. Fitzpatrick, Medical Officer, transferred to Sanitation Branch on the 17th July, 1928.

Dr. J. F. Southward, Medical Officer, transferred to Sanitation Branch on the 1st April, 1928.

Dr. G. M. Minifie, Medical Officer of Health, transferred from Sanitation Branch to Medical as Medical Officer on the 1st October, 1928.

Dr. H. G. Maguire, Medical Officer, had his appointment terminated on the 20th July, 1928.

Dr. J. H. Dobbin, Medical Officer, transferred to Sanitation Branch on the 4th December, 1928.

Miss I. J. Evans, Senior Nursing Sister, was transferred to Nigeria on promotion on the 23rd January, 1929.

Miss E. M. Scammell was transferred to the Gold Coast from Nigeria on promotion as Senior Nursing Sister on the 13th February, 1929.

Miss M. A. A. Swynnerton, Nursing Sister, was transferred to Nigeria on the 11th July, 1928.

Miss E. L. Motts and Miss M. E. Williams, Nursing Sisters, resigned their appointments during the year.

The appointments of Miss A. B. Bailey, Miss V. Riggs, Miss M. J. Shannon, Miss S. M. E. Edwards, Miss B. M. Head, Miss M. Beesley, and Miss L. Morgan terminated during the year.

STAFF—AFRICAN—MEDICAL.

Promotions.

Dr. F. Ribeiro was promoted African Medical Officer on the 1st June, 1928.

Mr. T. Hansen Quao, 2nd Division Dispenser, was promoted 1st Division Dispenser on the 6th October, 1928.

Appointments.

Dr. H. Mercer-Ricketts was appointed Junior African Medical Officer on the 8th May, 1928.

Mr. J. A. Adams was appointed Chief Attendant, Accra Lunatic Asylum, on the 1st August, 1928.

Other changes in the Staff during the year. Mr. R. P. Williams 1st Division Dispenser, retired on pension on the 6th October, 1928.

Mr. G. O. Nettey, Dispenser-in-Training, was invalided on the 7th February, 1929.

Messrs. J. C. Nettey, Nurse-in-Training and N. R. Aboah, Dispenser-in-Training, died on the 8th May, 1928 and 12th February, 1929 respectively.

Messrs. N. A. Appeti and K. Dixon, 2nd Division Nurses, had their appointments terminated on the 12th October, 1928 and 1st Setpember, 1928 respectively.

Messrs. P. D. Okine, J. H. Lartey, E. E. Erchampon, G. B. Sackey, M. Belo, E. G. Arwah, J. M. Kwofie, Miss G. Koi, Miss S. Marmon, Miss P. C. Cole, Miss N. E. L. Davies and Miss F. Marke, Nurses-in-training, had their appointments terminated during the year.

Messrs. L. A. K. Otchewema, H. K. Wellington and Miss L. Mintah, 2nd Division Nurses, resigned their appointments on the 13th May, 1928, 18th February, 1929 and 20th December, 1928 respectively.

Miss W. A. Brunger, Mr. E. F. A. Okwabie, Miss S. Quardey, Miss M. Sagu, Miss B. Ayaw, Miss A. E. Olympio, Miss F. Caster, Miss M. G. Ballard, Miss P. E. Larsen, Miss B. A. Davidson, Miss I. A. Ababioo, Mr. B. A. Okwabi, Miss M. Mingle, Miss M. N. Hyde, Miss T. N. Sappor, Miss S. Beckley, Miss E. T. Azu and Miss Dorcas Sey, Nurses-in-Training, resigned their appointments during the year.

Messrs. E. E. Benin, 2nd Division Dispenser, R. C. A. Mensah, Nurse-in-Training and S. Yaunde, Attendant, Lunatic Asylum, were dismissed on the 8th January, 1929, 6th February, 1929 and 11th February, 1929 respectively.

STAFF—EUROPEAN—SANITATION.

Appointments, Transfers, Promotions, etc.

Dr. W. M. Howells was promoted Senior Sanitary Officer on 1st April, 1928.

The following were appointed Medical Officers of Health :—

Dr. T. V. Fitzpatrick on transfer from the Medical Branch on 17th July, 1928.

Dr. J. F. Southward on transfer from the Medical Branch on 1st April, 1928.

Dr. H. V. Miller on 11th April, 1928.

Dr. J. H. Pottinger on 11th April, 1928.

Dr. J. H. Dobbin on transfer from the Medical Branch on 4th December, 1928.

The following were appointed Women Medical Officers :—

Miss J. R. Mason on 11th April, 1928, Miss E. M. Stratton on 11th April, 1928, Miss I. M. M. Aitken on 28th July, 1928, Miss W. D. Cargill on 7th November, 1928.

Miss C. O. J. Spackman was appointed Nursing Sister on 9th May, 1928.

The following were appointed Superintending Sanitary Inspectors during the year :—

Messrs L. G. Eddey, N. S. Elliott, J. F. Wilkie, E. J. Snell, R. H. Thomas, J. F. L. Sawer, W. J. Cooke, W. J. Getgood, H. A. Browning, C. W. Cottier, C. R. Parfitt and F. A. Peek.

As already pointed out Dr. G. M. Minifie, Medical Officer of Health was transferred back to the Medical Branch as Medical Officer on the 1st October, 1928.

The appointments of Dr. (Mrs.) N. A. Vane-Percy and Dr. A. M. K. O'Halloran terminated during the year.

Miss C. O. J. Spackman, Nursing Sister, resigned on the 23rd January, 1929.

STAFF—AFRICAN—SANITATION.

Promotions.

The following were promoted during the year :—Mr. A. E. Bentil, Senior Division Sanitary Inspector ; Mr. J. E. Quaison, First Division Sanitary Inspector ; Mr. J. S. Abbey, First Division Sanitary Inspector ; Mr. E. H. Nortey, First Division Sanitary Inspector.

The following addition to the staff were made during the year :— Three 2nd Division Clerks, fourteen Sanitary Inspectors-in-Training, ten Village Overseers, seven Nurses-in-Training, four Health Visitors, one Nurse Midwife, one Contagious Diseases Hospital Attendant.

Other changes :—The following were dismissed :—Mr. G. D. Okoe, 2nd Division Clerk ; Mr. S. A. Appiah, 2nd Division Sanitary Inspector ; Mr. J. N. Hammond and Mr. A. J. A. Nelson, 2nd Division Sanitary Inspectors had their appointments terminated.

The following 2nd Division Sanitary Inspectors resigned :—Mr. S. K. Addy, Mr. A. Oguabena and Mr. E. C. Ansah.

One Nurse-Midwife resigned and one Contagious Diseases Hospital Attendant retired on pension.

(*b*) ORDINANCES AFFECTING PUBLIC HEALTH.

The provisions of the Towns and Public Health Ordinance was applied to certain towns in the Colony proper including Damang in the Tarkwa District, Ongwa in the Cape Coast District, Bisa in the Volta River District and Akropong in the Ankobra District.

The Towns Ordinance was amended so that towns in close proximity to one another could be dealt with collectively. Owing to the closing down of Tarkwa Mine the Tarkwa Mining area was deleted from the Schedule of the Mining Health Areas.

Various ports and places were declared infected and several ports were placed in quarantine owing to the outbreak of infectious diseases during the year, the majority of the orders relating to same being revoked by the end of the year.

In addition to the above, two enactments which may have a considerable, if indirect, influence on public health were passed into law during the year under review, namely, the Spirit Licence (Amendment) Ordinance No. 32 of 1928, and the Children (Care and Reformation) Ordinance, No. 22 of 1928.

(*c*) FINANCE.

Estimated Expenditure for the year 1928–29.

(*a*) PERSONAL EMOLUMENTS.

Medical.

	£	s.	d.
Administrative Officers	5,600	0	0
Specialists	4,000	0	0
Senior Medical Officers	6,900	0	0
Medical Officers (European and African)	36,325	0	0
Dental Surgeons	1,446	0	0
European Nursing Staff	10,733	0	0
African Nursing Staff and Dispensers	24,178	0	0
Clerical Staff	3,563	0	0
Various Items, allowances, etc.	21,062	0	0
Estimated Total Personal Emoluments	113,807	0	0
Actual Total Personal Emoluments	108,542	19	11

Sanitation.

	£	s.	d.
Administrative Officers	2,700	0	0
Senior Sanitary Officers and Medical Officers of Health	14,402	0	0
European Sanitary Inspectors	9,467	0	0
African Sanitary Inspectors	13,868	0	0
Various Items, allowances, etc.	17,190	0	0
Estimated Total Personal Emoluments	57,627	0	0
Actual Total Personal Emoluments	50,978	0	3

Medical Research Institute.

	£	s.	d.
European Staff	9,931	0	0
African Staff	1,096	0	0
Estimated Total Personal Emoluments	11,027	0	0
Actual Total Personal Emoluments	9,893	0	8

(*b*) OTHER CHARGES.

Medical.

	£	s.	d.
Passages, Transport, etc.	14,594	0	0
Hospital Equipment, Drugs, Medical Appliances, Surgical Instruments, etc...	22,025	0	0
Diets, Medical Comforts	12,400	0	0
Other items	10,911	0	0
Contributions	820	0	0
Estimated Total	60,750	0	0
Actual Expenditure	64,603	15	10

Sanitation.

	£	s.	d.
Passages, Transport, etc.	11,351	0	0
General Sanitary Votes	25,231	0	0
Scavengers and Labourers	36,299	0	0
Estimated Total	72,881	0	0
Actual Expenditure	68,448	17	9

Medical Research Institute.

	£	s.	d.
Passages, Transport, etc.	3,007	0	0
General Research Votes	2,756	0	0
Estimated Total	5,763	0	0
Actual Expenditure	4,337	9	5

Estimated total expenditure, Medical Department	321,855	0	0
Actual total expenditure, Medical Department ..	306,804	3	1

Revenue earned by Medical Department :—

(*a*) Hospital Fees	£6,371	0	11
(*b*) Sale of Drugs in private practice	448	8	0
Total ..	£6,819	8	11

Revenue earned by the Sanitation Branch :—

(*a*) Fines for Sanitary offences ..	£8,192	0	9
(*b*) Market and Slaughter House fees	3,319	17	0
(*c*) Poundage Fees	206	4	0
(*d*) Births, Deaths, and Burials ..	637	12	6
Total ..	12,355	14	3

RATIO OF MEDICAL EXPENDITURE TO THE TOTAL EXPENDITURE FOR THE COLONY, 1928–29.

	£	s.	d.
Total Expenditure for the Colony (excluding Extraordinary or Special Expenditure)	2,553,423	0	0
Total Expenditure Medical Services (Medical, Sanitation, Research)	306,804	0	0

(This figure is exclusive of the cost of buildings, e.g. Hospitals, Dispensaries, etc., and other Public Health Works, such as Water Supplies, Town Improvements, etc.)

The ratio of total expenditure on Medical Services to the total Expenditure for the Colony was therefore 12.01 per cent.

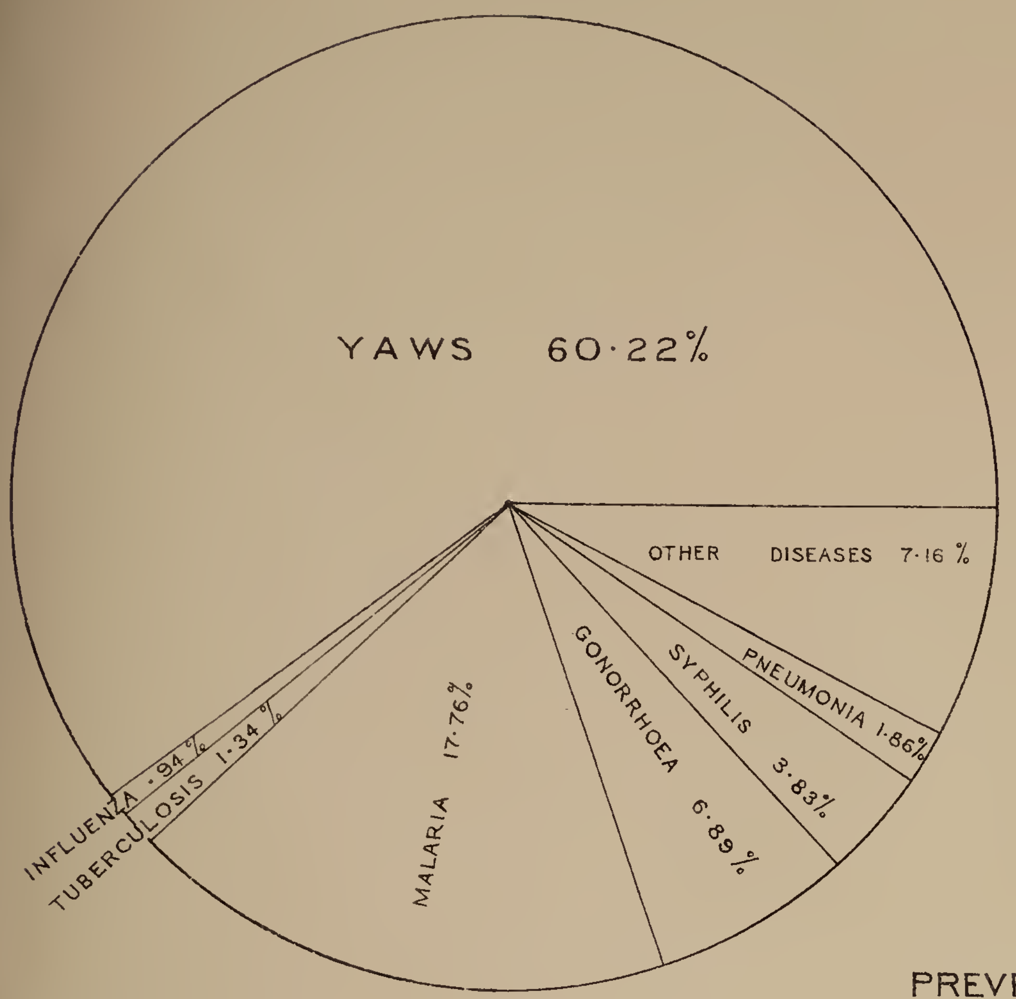
II.—PUBLIC HEALTH.

(*a*) General Remarks.

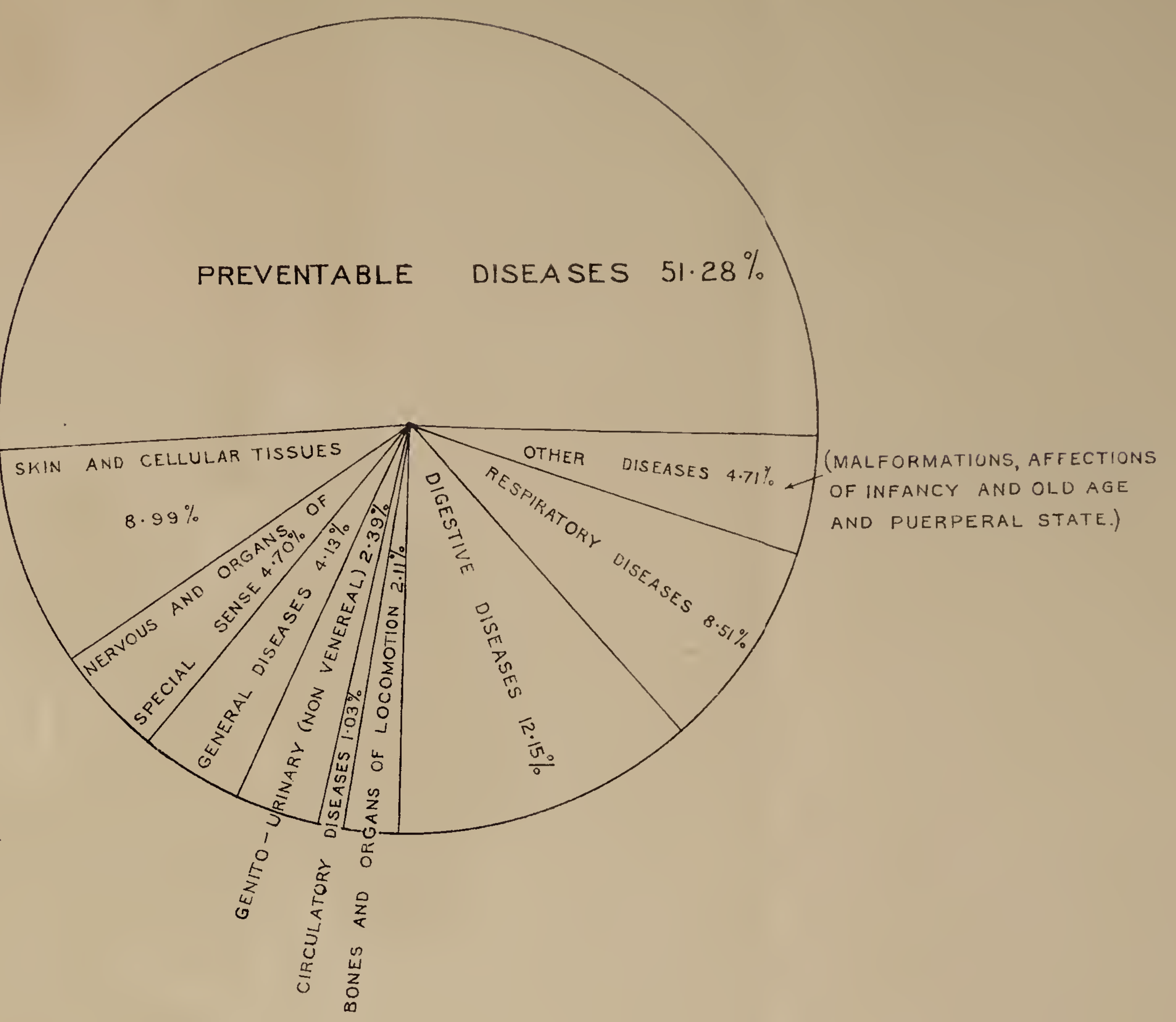
The following Table shows the most noteworthy contrasts in the Returns of Diseases treated by the Medical Branch only during the years 1926–27, 1927–28, and the period under review :—

Diseases.	1926–27.		1927–28.		1928–29.	
Small-pox	172		5		26	
Varicella (Chicken-pox)	165		171		488	
Dysentery :—						
(*a*) Amoebic	515	840	550	1,008	1,125	1,628
(*b*) Bacillary	145		130		304	
(*c*) Undefined or due to other causes	180		328		199	
Enteric Group :—						
(*a*) Typhoid Fever	16	84	19	30	47	64
(*b*) Para-typhoid A	15		2		6	
(*c*) Para-typhoid B	—		7		8	
(*d*) Type not defined	53		2		3	
Influenza	220		452		863	
Malaria :—						
(*a*) Tertian	1,301	6,436	2,706	8,971	2,422	10,002
(*b*) Quartan	91		14		532	
(*c*) Aestivo-autumnal	2,675		3,102		4,718	
(*d*) Cachexia	675		704		1,034	
(*e*) Blackwater	7		16		13	
(*f*) Unclassified	1,687		2,429		1,283	
Measles	44		53		136	
Pneumonia :—						
(*a*) Broncho-Pneumonia	257	788	209	976	421	1,560
(*b*) Lobar Pneumonia	447		614		988	
(*c*) Unclassified	84		153		151	
Trypanosomiasis (Sleeping Sickness)	67		59		94	
Whooping Cough	102		116		265	
Alcoholism	37		19		46	
Yellow Fever	86		45		2	
Tuberculosis :—						
(*a*) Pulmonary and Laryngeal	515	698	682	910	856	1,151
(*b*) Other forms	183		228		295	
Plague :—						
(*a*) Bubonic	—		—		—	
(*b*) Pneumonic	—		—		—	
(*c*) Septicaemic	—		—		—	
(*d*) Undefined	—		—		—	
Ankylostomiasis	—		275		365	

INFECTIVE DISEASES TOTAL INCIDENCE 90,447.

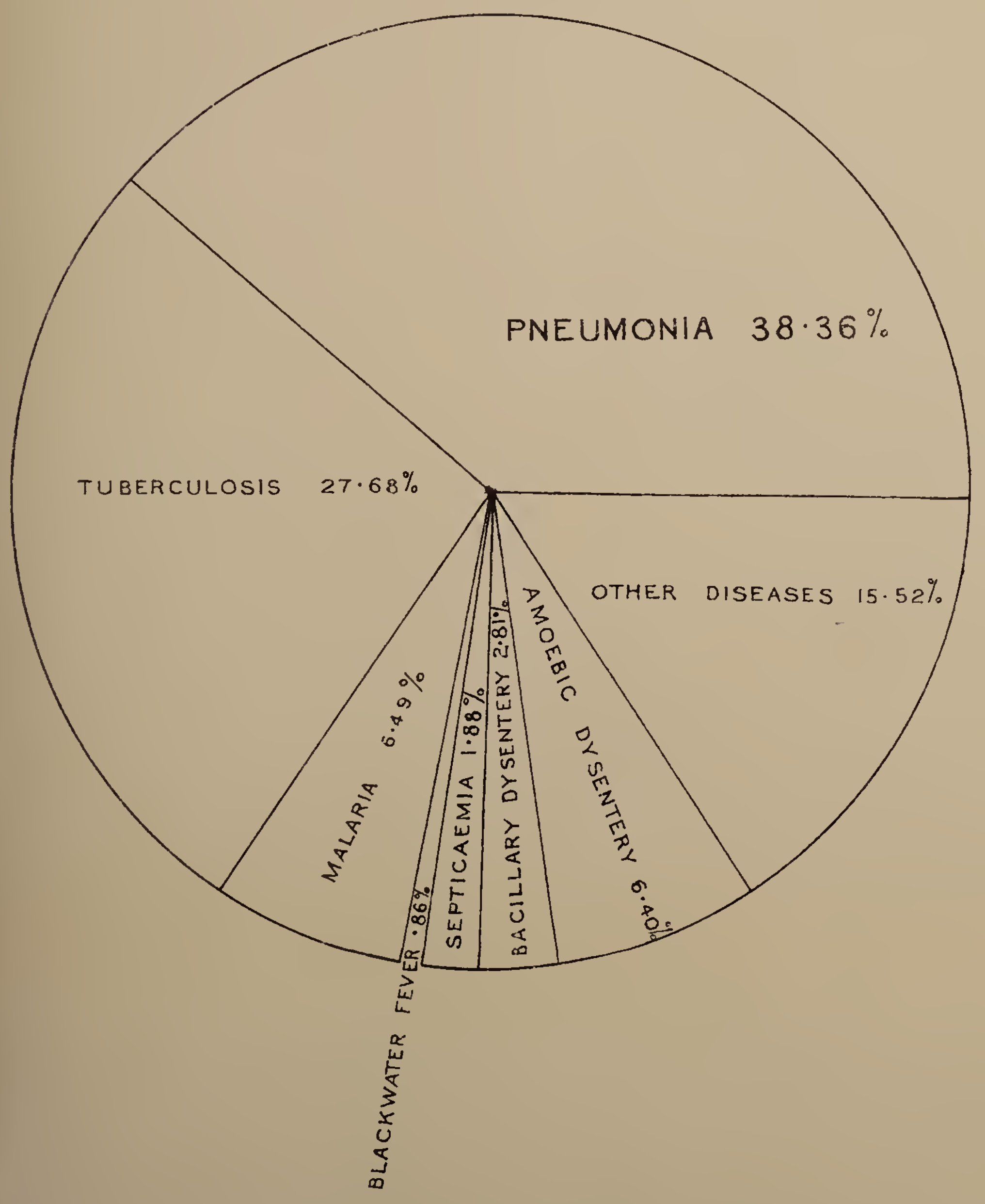


GENERAL SYSTEMIC AND PREVENTABLE DISEASES TOTAL INCIDENCE 215,240.

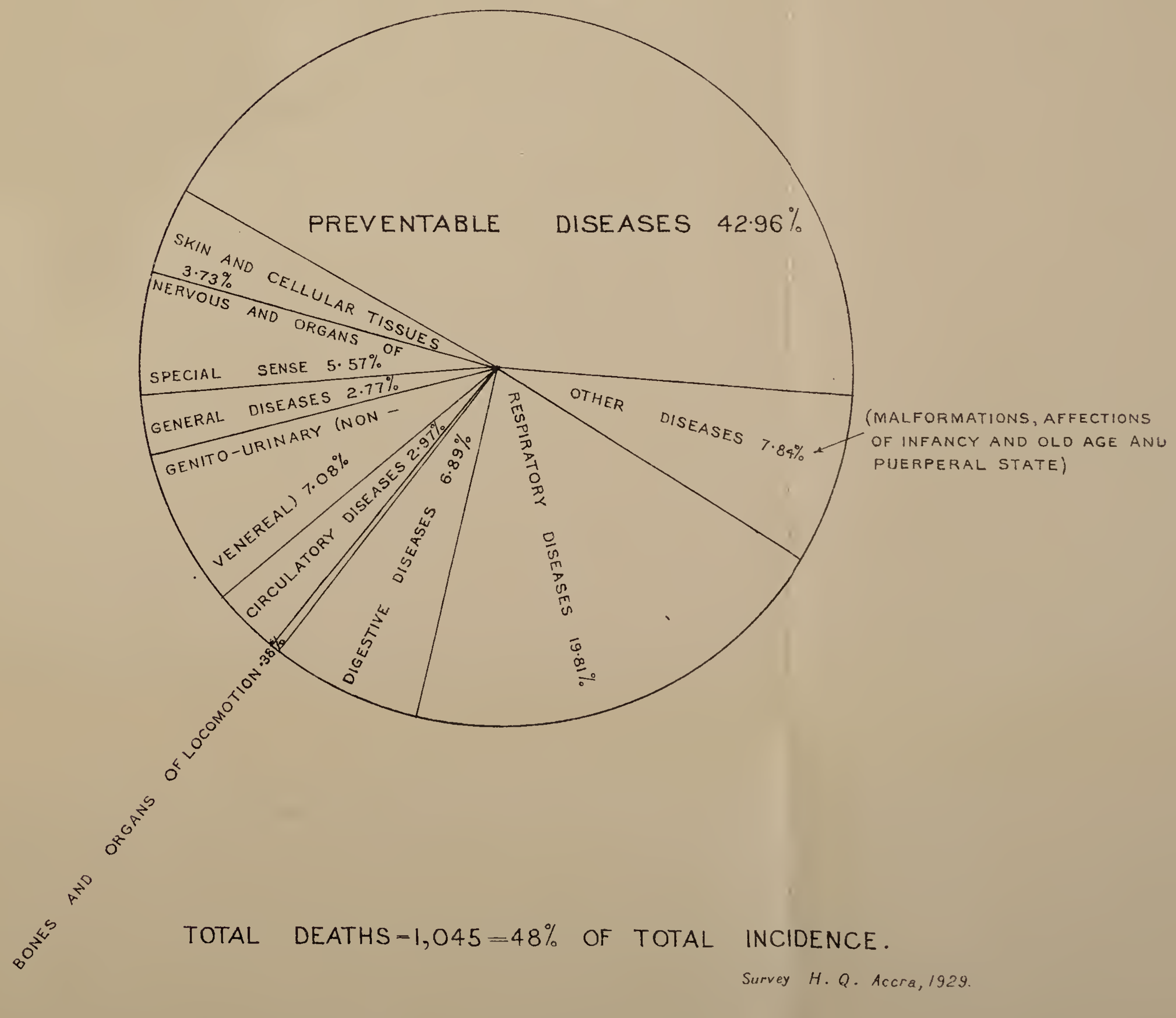


PREVENTABLE DISEASES ARE :—

(1) INFECTIOUS DISEASES.
(2) INTOXICATION AND POISONS.
(3) SCABIES AND TINEAE.
(4) HELMINTHS.
(5) AFFECTIONS PRODUCED BY EXTERNAL COURSES



TOTAL DEATHS= 477=·53% OF TOTAL INCIDENCE.



TOTAL DEATHS=1,045=48% OF TOTAL INCIDENCE.

Survey H. Q. Accra, 1929.

COMPARATIVE FIGURES FOR THREE YEARS 1926–27, 1927–28, 1928–29, FOR ALL PATIENTS TREATED IN HOSPITALS AND DISPENSARIES OF THE MEDICAL BRANCH.

Year.	Remaining in Hospital.	Total cases treated (in-and out-patients).	Deaths.	Remaining in Hospital.	Percentage of Deaths to total patients treated.
1926–27 ..	489	105,300	700	626	.88
1927–28 ..	626	133,069	980	601	.66
1928–29 ..	601	177,594	1,009	678	·57

HEALTH OF EUROPEAN COMMUNITY.

OFFICIALS AND NON-OFFICIALS.

This was fairly good throughout the year. There was fortunately no recrudescence of the Yellow Fever outbreak which had caused so much anxiety during the preceding two years, and no other outbreak of importance took place. Whooping cough prevailed in the Western Province of Ashanti (Ahafo) during the wet season and various outbreaks of chicken-pox took place throughout the Colony. An outbreak of mild influenza took place during the dry season.

Below are tables for Officials and Non-officials showing over a ten-year period the percentage of invalidings and deaths as compared with the numbers resident. From these it will be seen that in the case of officials the percentage of invalidings and deaths has been below average. In the case of non-officials the invalidings have been below average but the deaths slightly above average.

TABLE SHOWING INVALIDING AND DEATH-RATES OF EUROPEAN OFFICIALS IN THE TEN-YEAR PERIOD SINCE 1918 BASED ON THE AVERAGE NUMBER RESIDENT.

Year.	Average Number Resident.	Total invalided.	Percentage invalided.	Total died.	Percentage died.
1919	522	28	5.36	6	1.15
1920	620	30	4.83	7	1.13
1921	612	38	6.20	14	2.28
April, 1922—March, 1923	719	30	4.17	6	.83
1923–24	689	32	4.65	10	1.45
1924–25	680	58	8.52	7	1.02
1925–26	761	59	7.75	8	1.05
1926–27	783	49	6.26	3	.38
1927–28	835	39	4.67	6	.71
1928–29	881	50	5.67	4	.45
Average for the period	710.2	41.3	5.80	7.1	1.04

NOTE ON THE FOREGOING TABLE.

In 1921 the death-rate appears high, but the majority of the deaths were due to non-tropical ailments. Five out of fourteen only could be assigned to purely tropical diseases.

Similarly in 1923–24 only four out of the ten could be assigned to tropical diseases.

In 1924–25 one death was due to Dysentery and three (one doubtful) to Yellow Fever. The other three were non-tropical.

In 1927–28 only one (Blackwater Fever) out of the six could be called tropical.

In 1928–29 two; (one Blackwater Fever and one Yellow Fever) out of the four were purely tropical.

In order to compare the health of European Officials with that of Non-officials, two Tables are given below :—

EUROPEAN OFFICIALS—PERCENTAGE OF INVALIDINGS AND DEATHS TO TOTAL NUMBER RESIDENT.

Year.	Total number Resident.	Invaliding Percentage.	Deaths Percentage.
1919	653	4.29	.92
1920	775	3·87	.90
1921	768	4·94	1.82
1922–23	979	3.06	.61
1923–24	994	3.21	1.00
1924–25	846	6.85	.82
1925–26	994	5·93	.80
1926–27	1,046	4.68	.28
1927–28	1,202	3·24	·49
1928–29	1,280	3·90	·31
Average for the period ..	953·7	4·39	·79

EUROPEAN NON-OFFICIALS—PERCENTAGE OF INVALIDINGS AND DEATHS TO TOTAL RESIDENTS.

Year.	Total number Resident.	Invaliding Percentage.	Deaths Percentage.
1919	2,529	1.82	.87
1920	2,043	3·23	1.22
1921	2,171	2.44	.82
1922–23	2,019	2.27	1.23
1923–24	2,049	2.68	.68
1924–25	2,020	3·26	·59
1925–26	2,110	3·12	.66
1926–27	2,435	2.66	·94
1927–28	2,375	2.02	.88
1928–29	2,328	1·33	·94
Average for the period ..	2,267·9	2·483	0.88

Malaria was, as in previous years, the most frequent individual cause of illness. The following Table shows the relative position of

Malaria as a cause of time lost through sickness by European Officials during the year and as compared with recent years :—

Year.	Average No. Resident.	Total Sick days.	Total days on Sick List for Malaria.	Total days on Sick List for Other Diseases.	Percentage of days lost through Malaria to total days lost.	No. of days lost through Malaria for the year per 100 Residents.
1924–25 ..	680	8,614	1,746	6,868	20.26	256
1925–26 ..	761	6,108	1,547	4,561	25.32	203
1926–27 ..	783	6,847	1,204	5,643	17.58	153
1927–28 ..	835	7,023	1,530	5,493	21.81	183
1928–29 ..	881	7,177	1,661	5,516	23.14	188

AFRICAN OFFICIALS.

The general health of African Officials was not unsatisfactory. An inspection of the table given below under " Vital Statistics " shows that the percentage of deaths and invalidings to the average number resident remained about the same. There was, however, an increase in the total number who were placed on the sick list and in the average sick time to each resident but the average number of days on the sick list for each patient had declined.

GENERAL AFRICAN COMMUNITY.

The health of the general African Community was fairly good, there being a fortunate absence of any serious outbreak throughout the year.

The outstanding feature of the period was an even more remarkable rise than usual in the total number of patients treated.

In 1924–25 the total number of cases treated by the Medical Branch was 82,476. The increase on this figure in the following year was 18.5%.

In 1926–27 there was an increase over this of 7.5% and in 1927–28 there was the marked increase over the previous year's figures of 26.42%. Last year the actual gross total of in and out-patients treated by the Medical Branch was 177,594 giving an increase of 32.65% over the figures for the previous year. The demand for treatment is becoming a serious strain on the present medical establishment and much anxious thought is being given to the problem of how best to extend services and to render available to the masses the benefits of modern scientific medicine.

It should be noted that the above figures are exclusive of the figures of attendances at the Child Welfare and Ante-Natal Clinics which are maintained by the Sanitation Branch. The latter alone amounted during the year to no less than 37,646 and demands for new clinics come from all parts of the country.

A reference to the table of comparative figures for the three-year period 1926–27, 1927–28, and 1928–29 shows that the average percentage of deaths to the total of patients treated over the period was .66%. The average for the year under review was .57% and therefore shows a decline on the three-year average.

In the remarks given below the figures are taken from the returns provided by the Medical Branch only. These differ in places from the figures of the Sanitation Branch owing to the fact that treatment is often given by the latter branch in Contagious Diseases Hospitals, temporary isolation camps, villages, etc.

I. GENERAL DISEASES.

These diseases are not a more common cause of ill-health in the tropics than in temperate climates and little remark is called for under this head. A reference to the returns of diseases of in-and out-patients would, however, seem to indicate that cancer was slightly on the increase. The figures show 181 cancer cases out of 177,594 cases treated, namely .1%. It is difficult to be certain as to whether any increase is really taking place. It may be that, as in Europe better methods of diagnosis are revealing what was formerly not suspected.

II. COMMUNICABLE DISEASES.

These diseases, as before, cause most of the ill-health from which the community suffers.

(*a*) MOSQUITO OR INSECT-BORNE.

	1926–27	1927–28	1928–29.
Malaria ..	6,444	8,955	10,002

In the year 1927–28 the total represented 6.72% of all diseases treated. In the year under review the total equalled 5.63% of all cases treated. It is significant and encouraging to note that many Africans are beginning to realise the value of quinine especially for children and especially in areas where malaria is intense as at Koforidua. It is now quite common for parents to bring their children to the Medical Officer and say " my child is not now ill, but I want medicine to keep fever away," or " I want medicine to take away the lump in the child's belly," meaning to reduce an enlarged spleen.

BLACKWATER FEVER.

In the report for the year 1927–28, two five years' periods (1917–21 and 1923–28) were compared showing total Europeans resident, total cases and total deaths. The result was as follows :—

	1917–21.	1923–28.	1928–29.
Percentage of cases to total Residents ..	.89	.47	.16
Percentage Deaths to Cases	35.3	23.7	16.6

In the year under review 13 cases in all were recorded with five deaths. These can be classified as follows :—

	Cases.	Deaths.	Total Resident.
Europeans	6	1	3,608
Syrians	3	2	—
Indians	2	1	—
Africans	2	1	—

The percentage of European cases to total Europeans Resident was .16% which was well below the 5-yearly average of 1923–28 ; the case-mortality was below average.

The heavy case-mortality in Syrians and Indians is noteworthy. Cases of Blackwater amongst Africans are rare and a note on the two cases recorded will be found in an appendix (Appendix B). It is open to doubt whether these cases were true Blackwater Fever.

The Syrian and Indian population is steadily increasing year by year and their general standard of health and resistance to disease is poor. This is due partly to their mode of life and to the length of time they remain in the country. They suffer severely from Malaria and other diseases and a high case-mortality from Blackwater Fever is to be expected.

TRYPANOSOMIASIS.

In and Out-patients.

	1926–27	1927–28	1928–29
Cases ..	67	59	94
Deaths ..	11	4	18

The increase is not more than can be accounted for by the general increase in cases of all kinds coming forward for treatment. The disease on the Gold Coast is fortunately not the scourge it is in other parts of equatorial Africa and does not call for very special methods to deal with it. It not infrequently happens that it is accidentally discovered in a patient who is being examined for some other ailment.

YELLOW FEVER.

Happily no further cases following the outbreak of the previous two years occurred. The laboratory cases referred to in the report of the Sanitation Branch, cannot be considered as naturally occurring cases of the disease.

RELAPSING FEVER.

Last year the Sanitation Branch recorded 156 cases with seven deaths chiefly amongst the Zabrama labourers in Kumasi, emigrants from French Territory. In the present year 18 cases with two deaths were recorded by the Medical Branch and 16 cases with one death by the Sanitation Branch. The outbreak may therefore be considered for practical purposes to have come to an end.

The Assistant Director of Medical Service, Tamale, writes :—" Although there has been a fairly severe outbreak of this disease in French Country, there have been no cases reported in the Northern Territories. This is a lucky escape because thousands of French natives have been trekking South in search of work and they might very easily have spread the disease all along the line."

(*b*) INFECTIOUS DISEASES.

SMALLPOX.

Twenty-six cases were recorded by the Medical Branch and 76 by the Sanitation Branch. The majority of these cases occurred during a mild outbreak round Kobiri in the Wenchi area in Ashanti. Fortunately no deaths took place. Four small localized outbreaks took place in the Northern Territories with no deaths. Two of the latter took place near the western frontier in the Wa and Bole Districts respectively and were caused by French natives coming in from an infected area. The French suffered from a fairly large outbreak opposite Cherepong (between Wa and Lawra beside the frontier).

DYSENTERY.

One thousand six hundred and twenty-eight cases were recorded as compared with 1,008 for the previous year. There was a slight increase in the case-incidence. In 1926–27 the cases treated were .80% of all cases treated; in 1927–28 they were .76%, and in the year under review .92%. The case-mortality in the same three years was .048%, .042% and .029% respectively, an encouraging decline, probably due to earlier diagnosis and improved treatment.

ENTERIC GROUP.

Dr. A. J. R. O'Brien, C.M.G., Resident Medical Officer, Gold Coast Hospital, as a result of ten years experience gave it as his opinion that the virulence of this group of diseases had increased, the severity of cases recently seen being in marked contrast to that of those treated in former years.

INFLUENZA.

An outbreak took place all over the country during the dry season beginning about the month of December. Fortunately it was quite mild. During the months of January and February when the harmattan was severe this outbreak was going on in the Wa and Lawra Districts of the Northern Territories. At one time in the Wa District there were several deaths from broncho-pneumonia possibly due to the combined effect of an unusually severe harmattan and influenza. The total number of cases recorded was 863 with five deaths.

PNEUMONIA.

The total cases of this disease was 1,560 with 176 deaths. The figures for 1926–27 and 1927–28 was 788 with 129 deaths and 976 with 75 deaths respectively.

With the general increase in the number of cases coming forward for treatment an increase in this disease—as in dysentery—is to be expected. To what extent the increase is due to the increasing demand for treatment or to a genuine increase (such as might be caused, e.g. by the influenza outbreak) is difficult to say. The African is naturally very susceptible to this disease.

TUBERCULOSIS.

The following Table is worth close attention :—

TUBERCULOSIS—ALL STATIONS.

	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29
Cases	411	414	571	698	910	1,151
Percentage of Tuberculosis to all cases treated	.53	.50	.58	.66	.68	.65

The number of cases of tuberculosis relative to the total number of all cases treated shows a slight drop on the previous year and although the table would indicate a steady general increase it does not justify dogmatic conclusions or that expensive experiments should be made which might later prove failures.

It is believed that the resistance of the African to the pulmonary form of the disease, once the disease is established, is generally speaking low, although some officers aver that the African has a greater degree of natural immunity than he is usually credited with, cases of the chronic type seen in Europe with arrestment of the disease being occasionally seen. Certainly labourers from Northern parts coming to Coast towns and mining centres and living under altered conditions of diet and housing do suffer severely. The Secretary of State has sanctioned the erection of an additional half-block to the Gold Coast Hospital and a special tuberculosis officer for the year 1929–30, and it is hoped that in the next few years when further experience of the prevalence and type of the disease and of the results of treatment is gained it will be possible to advise better on what steps should be taken to deal with it.

In this connection a useful note on tuberculosis as seen in the Gold Coast Hospital has been written by Dr. A. J. Hawe, Medical Officer, and is included in this report as an Appendix (Appendix C).

Meanwhile it is felt that with attention to general sanitation and especially to housing conditions the disease can be kept within reasonable limits.

VENEREAL DISEASES.

A steady increase is recorded in the number of cases treated. The following figures show what is being done in the Colony generally :—

	1926–27	1927–28	1928–29
Gonorrhoea	3,769	3,356	4,809
Syphilis	1,277	1,802	3,434
Chancroid	246	295	419

The report of the Venereal Clinic, Accra, will be found under a special section elsewhere.

Gonorrhoea appears to be increasing in the Northern Territories, especially in places like Navrongo and Zuarungu, where it is known as the " Kumasi disease." This is due to the opening up of the country by roads.

Syphilis is, however, not at all prevalent there according to the reports of medical officers.

LEPROSY.

In the year 1927–28, 830 cases were treated with one death. This figure had in the year under review grown to 1,426 cases with one death. A special report on the activities of the Leper Settlement at Ho, Togoland, is given in Appendix D. A small settlement also exists at Yendi where useful work is being carried on.

In the report for 1927–28, it was pointed out that a whole time specially trained Medical Secretary to the local branch of the British Empire Leprosy Relief Association was to be appointed for the purpose of making a leprosy survey of the Colony. Dr. M. B. Duncan Dixey was selected and arrived in the Colony early in the year and has spent his whole time travelling through various districts. Togoland, the Colony proper, Ashanti and the Northern territories have been visited and a valuable body of facts has already been collected. When these are digested a more accurate idea of the prevalence of the disease will have been obtained and plans can then be formulated for extending relief to sufferers. Meanwhile a brief summary of Dr. Dixey's work is attached to this report as an Appendix (Appendix E). All reports from Medical Officers agree that the modern treatment of Leprosy has immensely improved the outlook for those affected. It can now be said that cases taken in hand in the early stages and given persistent treatment can in the majority of cases be promised cure.

ANKYLOSTOMIASIS.

In the year 1927–28, 275 cases with 10 deaths were recorded.

In the year under review there were 365 in all treated with four deaths. Large numbers of individuals harbour the parasite and appear to suffer little. In the area round Essiama and Attuabo in the Axim District where there is a heavy rainfall, sandy soil and plenty of shade round the villages, very severe cases are frequently seen.

ASCARIASIS.

Very common especially in children and a source of much ill-health amongst them. Death occasionally occurs when infestation is high, owing to intestinal obstruction or other complication.

SCHISTOSOMIASIS.

This is possibly more prevalent than is disclosed by the figures from returns. 225 cases were recorded for 1928–29 as compared with 192 and 244 for 1926–27 and 1927–28 respectively. The distribution of the disease is patchy. It is relatively common in the reaches of the Volta River below Akuse and especially around Assuchari and Osudoku where the river overflows during the rains and forms large lagoons and creeks in which people wash and bathe. Patients attending for the vesical form of the disease nearly always imagine that they are suffering from gonorrhoea.

YAWS.

This disease prevails everywhere and its treatment takes up much time in all stations. Out of the 177,594 patients treated by the Medical Branch, no less than 43,838 or 24.68% were yaws cases. An interesting report of work done in the Yaws Clinic of the Gold Coast Hospital is given in Appendix G.

Certain Medical Officers definitely note a decrease in the number of yaws cases in their areas and attribute this to the results of treatment. This is a most encouraging observation and argues well for the future.

The Assistant Director of Medical Service, Tamale, notes as an extraordinary fact that the Bawku District in the Northern Territories (a thickly populated area) is practically free from this disease. The Medical Officer, Yendi, points out that it is very prevalent amongst the Konkombas, one of the most primitive tribes in Northern Togoland.

SKIN DISEASES.

These are exceedingly common especially in the Northern Territories where water is scarce and facilities for frequent washing are lacking. The want of good water supplies in the Northern Territories and in parts of the Eastern Province of the Gold Coast is a very serious handicap to the health of the inhabitants of these areas.

EYE DISEASES.

Are very prevalent in the Northern Territories where water is scarce during the dry season and the heat and dust are very trying. Cases of severe conjunctivitis with corneal ulcerations leading to opacities and often to blindness are very common. In the forest and Coastal belt eye diseases are fortunately not common.

GUINEA WORM.

Very prevalent in the Northern Territories and other dry parts from April till the end of the rains. A specific for this affection is greatly to be desired.

(*b*) VITAL STATISTICS.

GENERAL EUROPEAN POPULATION.

	1927–28	1928–29
(i) Government Officials	1,202	1,280
(ii) Employees of Trading Firms	1,737	1,712
(iii) Employees of Mining Companies	486	457
(iv) Missionaries	152	159
Total	3,577	3,608

An increase of 78 Government Officials over the previous year took place and a decrease of 47 non-officials.

(1) EUROPEAN OFFICIALS.

TABLE SHOWING SICK, INVALIDING AND DEATH RATES.

	1926–27	1927–28	1928–29
Total number of Officials resident	1,046	1,202	1,280
Average number resident	783	835	881
Total number on the Sick List	795	792	846
Total number of days on Sick List	6,847	7,023	7,177
Average daily number on Sick List	18.75	19.24	19.6
Percentage of Sick to average number resident	2.39	2.30	2.22
Average number of days on Sick List for each patient	8.61	8.86	8.48
Average sick time to each resident	8.72	8.41	8.14
Total number invalided	49	39	50
Percentage of invalidings to total residents ..	4.68	3.24	3.90
Percentage of invalidings to average number residents	6.26	4.67	5.67
Total Deaths	3	6	4
Percentage of deaths to total residents ..	0.28	0.49	0.31
Percentage of deaths to average number of residents	0.38	0.71	0.45
Number of cases of sickness contracted away from residence	Not available.	Not available.	Not available.

EUROPEAN OFFICIALS—INVALIDINGS AND DEATHS, 1928–29.

TABLE SHOWING SEX OF OFFICIALS.

		No.	Deaths.	Invalided.	Death Rate per 1,000.	Invaliding Rate per 1,000.
Officials	Males	1,227	4	47	3.26	38.30
	Females	53	—	3	—	54.60
Totals		1,280	4	50	3.12	39.06

NUMBER OF DAYS ON SICK LIST.

	1926–27	1927–28	1928–29
Tropical Diseases	2,734	2,368	2,241
Non-tropical Diseases	4,113	4,655	4,936
Total	6,847	7,023	7,177

Causes of Invaliding of European Officials :—Debility and Anæmia 1, General Debility and Dyspepsia 1, Melancholia and mental depression 1, Arthritis, Anæmia and Debility 1, Gastric ulcer and Visceroptosis 1, Bilious Remittent Fever 1, Neurasthenia and Disordered action of Heart 1, Deafness and Gout 1, Subtertian Malaria 4, Septic Absorption 1, Pyelo-Nephritis 1, Obstruction of Bile duct (? Gall Stone) 1, Neurasthenia and Gastritis 1, Paratyphoid B 2, Meningeal Hæmorrhage 1, Synovitis knee 1, Acute Gastritis 1, Early Optic Neuritis 1, Cerebral Tumour (Syphilis ?) 1, Chronic Cystitis 1, Carcinoma 1, Myocardial Weakness 1, Neurasthenia 1, Debility 2, Dysentery (Bacillary) 1, Multiple Furunculosis 1, Malaria and Inguinal Adenitis 1, Hepatitis 1, Malarial Fever 1, Alcoholism 1, Malaria 4, Nervous Debility 2, Headache and Dysentery 1, Bronchitis and Laryngitis 1, Malaria and Typhoid 1, Bronchitis 1, Asthma 1, Gastro Enteritis 1, Otitis Media 1, Chronic Otitis and Debility 1, Anal Abscess and Sinus 1,—Total 50.

Of the 50 officials invalided only four were military.

Causes of Deaths of European officials :—Cardiac Failure following Blackwater Fever 1, Cerebral Hæmorrhage (accident) 1, Typhoid Fever 1, Yellow Fever 1—Total 4.

EUROPEAN OFFICIALS—INVALIDINGS.

ANALYSIS OF RESIDENTIAL SERVICE.

Serving under.	Residential Service.						Total.
	Under 6 months.	6 but under 9.	9 but under 12.	12 but under 15.	15 but under 18.	18 months and over.	
Old Leave Regulations ..	—	—	3	1	—	—	4
New Leave Regulations ..	5	5	8	15	9	4	46
							50

Invaliding Rate per 1,000.

1925–26..	59·35
1926–27..	46.84
1927–28..	32.44
1928–29..	39·06

Death Rate per 1,000.

1925–26..	8.04
1926–27..	2.87
1927–28..	4·99
1928–29..	3·12

EUROPEAN MORTALITY AND INVALIDING RATES FOR THE YEAR.

	No.	Deaths.	Invalidings.	Death Rate per 1,000.	Invaliding Rate per 1,000.
Officials	1,280	4	50	3·12	39.06
Non-officials	2,328	22	31	9·45	13·31

II.—EUROPEAN NON-OFFICIALS.

TABLE SHOWING INVALIDING AND DEATH RATES.

1926–27.	No.	Deaths.	Invalided.	Death rate per cent.	Invaliding rate per cent.
Merchants	1,861	13	49	0.69	2.63
Mining Companies	440	5	15	1.13	3.40
Missionaries	134	5	1	3·73	0.74
Totals..	2,435	23	65	0.94	2.66
1927–28.					
Merchants	1,737	16	30	0.92	1.72
Mining Companies	486	—	16	—	3.29
Missionaries	152	5	2	3·28	1.31
Totals	2,375	21	48	0.88	2.02
1928–29.					
Merchants	1,712	16	22	0.93	1.28
Mining Companies	457	6	8	1.31	1.75
Missionaries	159	—	1	—	.62
Totals	2,328	22	31	·94	1·33

EUROPEAN NON-OFFICIALS—INVALIDINGS AND DEATHS, 1928–29.

TABLE SHOWING SEX OF NON-OFFICIALS.

		No.	Deaths.	Invalided.	Death Rate per 1,000.	Invaliding rate per 1,000.
Merchants	Males	1,339	14	22	10.45	16.43
	Females	373	2	—	5·36	—
Mining Companies ..	Males	454	6	8	13·21	17.62
	Females	3	—	—	—	—
Missionaries	Males	103	—	1	—	9·70
	Females	56	—	—	—	—
	Totals	2,328	22	31	9·45	13·31

Causes of Invaliding of Non-official Europeans :—Neuritis 1, Pulmonary Tuberculosis 4, Renal Calculus 1, General Debility 1, Sleeping Sickness 1, Abscess of hip, left 1, Angina Pectoris 1, Inflamation of Inguinal glands 1, Ill-health 2, Varicocele 1, General Physical unsuitability 1, Blackwater Fever 2, Enteritis 1, Neurasthenia 1, Myocarditis 1, Malaria 4, Mitral Regurgitation 1, Cellulitis 1, Fracture and Tumour 1, Kidney Calculus 2, Synovitis of Knee 1, Not known 1—Total 31.

Causes of Deaths Non-official Europeans :—Appendicitis 3, Myocarditis and Cirrhosis of liver 1, Broncho-pneumonia 4, Malaria 1, Epithelioma 1, (*a*) Malaria, (*b*) Hyperpyrexia (*c*) Cardiac failure 1, Blackwater Fever 3, Heart Disease 1, Valvular Disease of Heart 1, Meningitis 1, Belladonna poisoning 1, Gunshot wound 1, Diabetes 1, Chronic Nephritis 1, Lorry accident 1—Total 22.

III.—AFRICAN OFFICIALS.

TABLE SHEWING SICK, INVALIDING AND DEATH RATES.

	1926–27	1927–28	1928–29
Total number of Officials resident	3,512	3,771	3,983
Average number resident	3,382	3,460	3,655
Total number on Sick List	771	744	1,252
Total number of days on Sick List	8,492	7,463	11,955
Average daily number on Sick List	23.26	20.44	32.66
Percentage of sick to average number resident	0.68	0.59	0.89
Average number of days on Sick List for each patient	11.01	10.03	9.54
Average sick time to each resident	2.51	2.15	3.27
Total number invalided	18	29	25
Percentage of Invalidings to total residents..	0.82	0.58	0.62
Percentage of invalidings to average number resident	0.86	0.64	0.68
Total deaths	22	20	21
Percentage of deaths to total residents ..	0.62	0.53	0.52
Percentage of Deaths to average number resident	0.65	0.57	0.57
Number of cases of sickness contracted away from residence	Not available.	Not available.	Not available.

Causes of Invaliding of African Officials:—Dilated Heart and Aortic Stenosis 1, Chronic Nephritis 1, Optic Atrophy 2, Defective Vision 1, Mental changes with early Paranoia 1, Defective Vision and Chronic Bronchitis 1, Scar on Penis 1, Writer's Cramp 1, Pulmonary Tuberculosis 4, Chronic Bronchitis and Emphysema 1, Chronic Intersitial Nephritis 1, Optic Neuritis 1, Anæmia (Ankylostomiasis) 1, Insanity 1, Hodgkin's Disease 1, Bilateral Effusion into Pleural Cavities 1, Myocardial inefficiency 1, Debility 1, Tubercular Peritonitis and marked Ascites 1, Chronic Rheumatism and signs of senility 1, Physical and mental Debility 1—Total 25.

Causes of deaths of African Officials:—Peritonitis 2, Pulmonary Tuberculosis 2, Broncho-Pneumonia 1, Chronic Nephritis 1, Intestinal Obstruction 1, Double Lobar Pneumonia 1, Rupture of Liver abscess into abdominal Cavity 1, Tubercular Peritonitis 1, Cardiac Failure 1, Lobar Pneumonia 1, Myocardial Degeneration 1, Appendical Abscess 1, Tetanus 1, Empyema 1, Fracture of Skull 1, Acute Malaria and Heart failure 1, Tuberculosis (Generalized) 1, Hæmoptysis 1, Hodgkin's disease 1—Total 21.

IV.—GENERAL AFRICAN POPULATION.

For the sake of comparison with previous years particulars are given below of births, deaths and infant mortality rates at six of the principal centres of population in the Colony and Ashanti.

During 1928–29, births and deaths registered at the twenty-six registry offices numbered 5,827 and 5,109 respectively as compared with 5,266 and 5,059 in 1927–28.

Town.	Deaths.				Births.				Infant Mortality Rate.			
	1925–26.	1926–27.	1927–28.	1928–29.	1925–26.	1926–27.	1927–28.	1928–29.	1925–26.	1926–27.	1927–28.	1928–29.
Accra	1,207	1,130	1,233	1,276	1,082	2,095	2,030	1,925	258	124	128	150
Kumasi	428	436	524	561	581	550	474	679	77	110	142	88
Cape Coast	341	315	325	343	219	306	273	303	123	124	124	99
Sekondi . ..	309	375	324	280	150	242	235	215	173	61	68	51
Koforidua	238	239	215	197	39	173	187	488	769	196	176	181
Tarkwa	125	190	190	122	29	72	34	66	172	152	382	51
Total ..	2,648	2,685	2,811	2,779	2,100	3,438	3,233	3,676	—	—	—	—

III.—HYGIENE AND SANITATION.

A.—General Review of Work Done and Progress Made.

1. Mosquito and Insect-Borne Diseases.

(*a*) MALARIA.

Following the satisfactory results obtained by the use of Paris Green in the United States of America and in Italy and other parts of Europe, this substance mixed with ninety-eight parts per weight of wood ashes, dust, etc., was used on a large scale for the first time in 1928–29 and with good effect.

Other anti-mosquito measures taken included drainage schemes.

Marked progress was made in filling in and draining some of the low-lying areas in Kumasi, while an excellent start was made on the production of a straight, well-defined edge on the eastern margins of the Korli lagoon in Accra.

Writing of this scheme in his Annual Report, the Medical Officer of Health, Accra, stated as follows :—

> " The intention is to convert the lagoon from an expanse of water with very shelving edges, covered with grass, which become flooded with even a slight rise in the water level of the lagoon, to an artificial lake with steep stone-faced banks. The lagoon is well stocked with fish, and it is reasonable to suppose that they, aided by the normal wave action, will control development of mosquitos in the lagoon.
>
> " To prevent flooding of the country farther inland, an outfall, with tidal flaps sufficiently far out to be unlikely to silt up, is to be constructed at the south west corner of the lagoon. By means of this it is hoped that the lagoon level will be kept sufficiently low for the marshes at Adabraka and Agblogbloshie to be gradually reclaimed."

These marshes have been the cause of much discomfort and a considerable amount of ill-health in the neighbouring townships for many years past and the reclamation of large hitherto mosquito-breeding tracts will have an important influence on the health and well-being of the populations affected.

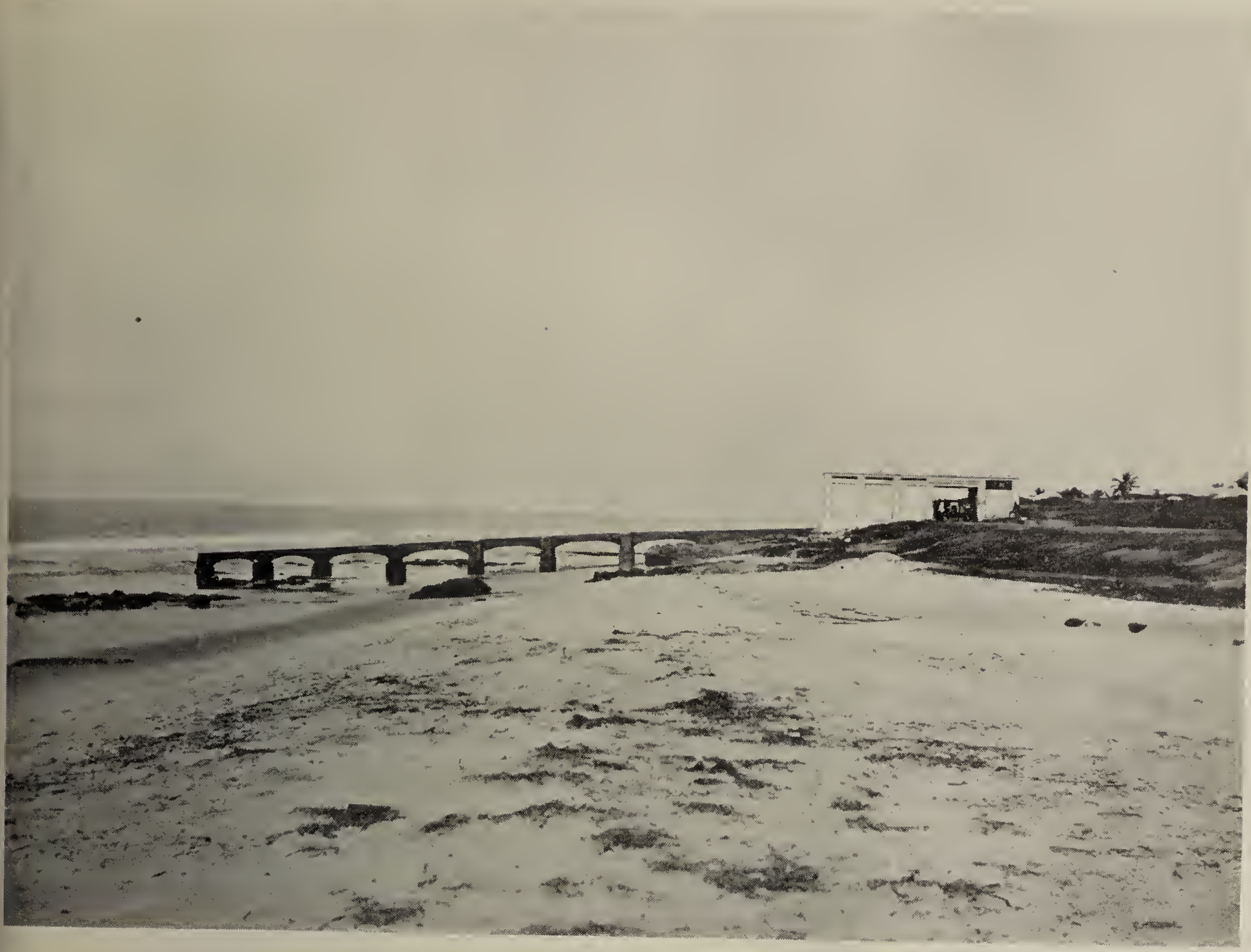
An experiment was essayed during the year of stocking a large lagoon situated about four miles west of Accra with fish from the Korli lagoon.

The former lagoon had been responsible for a considerable portion of the mosquito nuisance prevailing at Korli Bu. The mortality in the fish, most of which were of the top-minnow species, was considerable in spite of the fact that air was pumped into the containers during the transport by head-load.

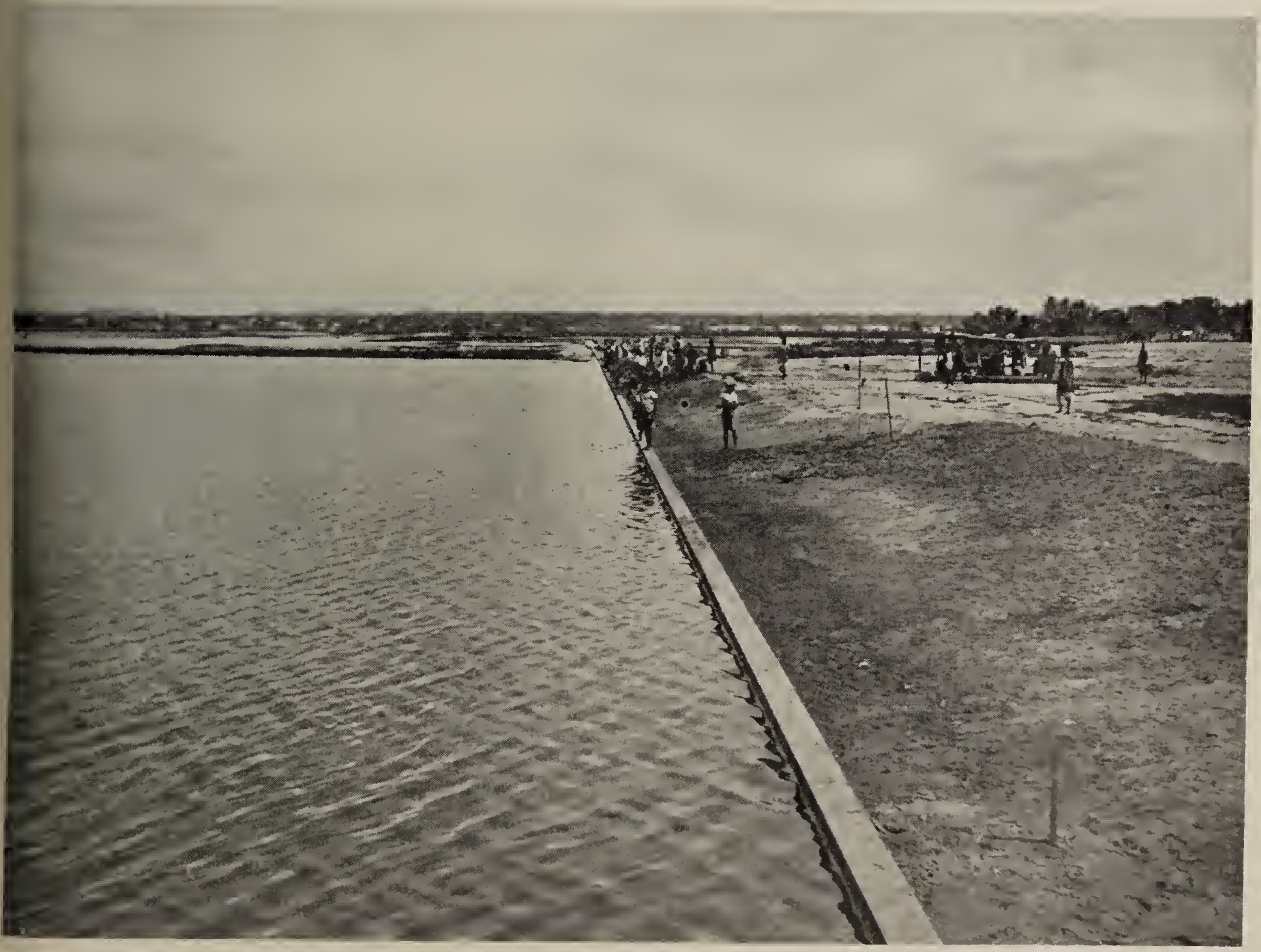
It is gratifying to be able to report that the fish multiplied to such an extent that the lagoon is now entirely free from mosquito larvæ and local fishermen are actually netting the small fish for the first time in nearly ten years.

Absence of oil and Paris Green was the original incentive for the experiment.

Table I illustrates the incidence of malaria in school children in some of the more important townships.



Accra. Tipping Depot for Night-Soil, at Low Water.



Accra. First Portion of Korli Lagoon Reclamation Scheme.

TABLE I.

Towns.	Percentage of Enlarged Spleens.	
	1927–28.	1928–29.
Accra	34.4	18.9
Sekondi	24.3	22.8
Koforidua	58.1	46.8
Kumasi	28.6	27.5

(*b*) YELLOW FEVER.

It is satisfactory to be able to relate that only two cases of yellow fever came under notice during 1928–29.

Both cases which ended fatally were believed to have been accidentally infected with virus while engaged in research work on the disease.

Dr. Hideyo Noguchi of the Rockefeller Yellow Fever (West African) Commission and Dr. W. A. Young, Director of the Medical Research Institute, Gold Coast, were the victims of this tragic occurrence.

The work of the Commission is now largely confined to Nigeria.

Table II gives the incidence of the disease in the decennial period ending the 31st of December, 1928. No cases were reported between the 1st of January and the 31st of March, 1929.

TABLE II.

Year.	Cases.	Deaths.	Percentage Mortality.
1919	11	7	63.6
1920	2	1	50.0
1921	4	4	100.0
1922	10	8	80.0
1923	19	16	84.2
1924	8	6	75.0
1925	7	4	57.1
1926	65	18	27.6
1927	107	40	37.3
1928	2	2	100.0

Preventive measures against this disease were largely directed towards increased vigilance in suspected endemic areas. This was made possible by the considerable expansion in the staff of health officers and European sanitary inspectors recently sanctioned by the Secretary of State.

The number of domiciliary visits carried out by the staff and the number of premises on which mosquito larvae were found to be breeding are given with certain other details as affecting five of the larger centres in Table III.

TABLE III.

Station.	Domiciliary Visits.		Instances of Larvæ.		Larval Index.	
	1927–28.	1928–29.	1927–28.	1928–29.	1927–28.	1928–29.
Accra	144,834	168,405	970	1,202	0.6	0.7
Koforidua	44,317	39,545	307	254	0.6	0.6
Cape Coast	47,285	54,251	414	539	0.9	0.9
Sekondi	57,347	48,530	336	274	0.5	0.5
Kumasi	61,450	61,850	570	895	0.9	1.4

Various Orders by the Governor under the Quarantine and Infectious Diseases Ordinances declaring certain ports infected owing to outbreaks of yellow fever were made and revoked during the year.

These included the following :—Accra, Grand Popo, Matadi, Ouidah, Bathurst and Monrovia.

A conference of Medical and Sanitary representatives of French and British West Africa was held at Dakar from the 23rd of April to the 1st of May, 1928, with a view to organising concerted efforts against yellow fever in West Africa.

Dr. Selwyn-Clarke was selected to represent the Gold Coast and his report, published as Sessional Paper No. VII of 1929-30, is given in the appendix.

The majority of the resolutions made at the conference—for details of which see report—met with general acceptance of the Governments represented at the conference.

Hindle's work in England with vaccine obtained from monkeys infected with the Dakar (Sellards) strain of virus was an outstanding event of the year.

It is hoped early in the coming year to carry out a field trial on the Gold Coast with vaccine prepared after the method devised by Hindle at the Wellcome Research Laboratories.

If this is attended by the success anticipated, supplies will be available for use throughout West Africa ; as a consequence the disease will be robbed of many of its terrors.

(*c*) FILARIASIS.

This disease is not of sufficient importance in the Gold Coast to call for the exhibition of any particular preventive measures.

(*d*) TRYPANOSOMIASIS.

Careful investigations are being made as to the incidence of this disease in cattle.

Unlike in some sister colonies e.g., Nigeria, human sleeping sickness is not a problem of any magnitude in the Gold Coast.

Only twenty-six deaths among the 5,182 recorded were certified as having been due to this malady during 1928—a ratio of 0.5 per centum.

Efforts were made to maintain clearings round villages and in the vicinity of fords in tsetse-infested localities, and such cases as were encountered were treated with varying results with " Bayer 205 ".

2. INFECTIOUS DISEASES.

(*a*) CEREBRO-SPINAL MENINGITIS.

The Colony was fortunate in remaining free from an outbreak of this disease during the period under review.

Among four cases reported all of which were from Ashanti, there were three deaths.

Improvements in the type of houses erected and in the town planning and layout of towns and villages formed the principal lines of attack against the disease.

(*b*) DYSENTERY.

Weekly telegraphic returns from stations received during the period 1st of April, 1928, and 30th of March, 1929, gave a total of 922 cases of dysentery with 130 deaths, a case mortality rate of 14 per centum. The distribution of the disease is given below but it should be borne in mind that the table does not represent the true incidence of the disease, since the number of reporting stations is much greater in the Colony proper than in the Colony of Ashanti or in the Protectorate of the Northern Territories.

TABLE IV.

	Colony.		Ashanti.		Northern Territories.		Total.	
	1927–28.	1928–29.	1927–28.	1928–29.	1927–28.	1928–29.	1927–28.	1928–29.
Cases	641	727	83	127	30	68	754	922
Deaths	62	112	8	17	1	1	71	130

(*c*) ENTERIC.

While the number of cases of enteric that are reported in the Gold Coast from year to year is small, the case mortality rate is by no means insignificant.

For example, among twenty-eight cases of enteric including four of paratyphoid there were five deaths—a case mortality of over seventeen per centum.

The cases in question were distributed as follows:—Accra 14, Sekondi 7, Winneba 2, Cape Coast ex-Saltpond 1, Koforidua 1, Kumasi 1, Kintampo 1, Tamale 1.

In view of the fact that few of the larger towns enjoy pipe-borne water supplies and that the danger of infection resulting from the pan conservancy is considerable, there can be no doubt as to the value of inoculation with anti-typhoid vaccine of Europeans before coming to this Colony.

(*d*) PLAGUE.

No cases of plague in humans or in rodents were discovered during the year, but anti-plague measures were not allowed to be neglected more especially as human and rodent infection continued to persist in Nigeria, the Senegal and the Canary Islands.

Legislation was introduced making compulsory the use of rat-guards and other anti-rat measures by ships from infected port mooring to the leeward breakwater at Takoradi.

Rats numbering 78,962 were captured and destroyed in five of the more important ports and townships. Fresh supplies of anti-plague vaccine were kept ready for emergencies.

(*e*) SMALLPOX.

Small groups of cases of smallpox were reported during 1928-29, the disease being invariably of a mild type and difficult to distinguish from chickenpox. No deaths from smallpox were recorded during the year. The distribution is shown in Table V.

The majority of the cases in Ashanti were discovered in the Wenchi district in the early months of 1929.

TABLE V.

	Colony.		Ashanti.		Northern Territories.		Total.	
	1927–28.	1928–29.	1927–28.	1928–29.	1927–28.	1928–29.	1927–28.	1928–29.
Cases	22	8	—	53	12	15	34	76
Deaths	1	—	—	—	3	—	4	—

In addition to case isolation in temporary bush huts constructed at a distance from centres of population, vaccination formed the main line of defence against the disease.

Twelve vaccinators were employed at the ports and at other strategic points, e.g. at the Yegi Ferry.

Lanolinated lymph from the Lister Institute was used with uniform success except in the western portion of the Northern Territories where a large number of vaccinations were unsuccessful as the result of the use by mistake of a quantity of inert vaccine which had been kept in the Protectorate for many months.

The number of vaccinations performed is given below.

TABLE VI.

	1926–27.	1927–28.	1928–29.
Total Number vaccinated	243,675	232,300	274,795
Total Number verified successful	135,837	82,004	65,146
Percentage verified successful	55·7	35·3	23·7

(*f*) LEPROSY.

The specialist medical officer appointed in connexion with the world-wide anti-leprosy campaign continued to carry out his survey of the incidence of the disease in the Gold Coast and was in charge of a travelling dispensary for some months.

After investigating the prevalence of leprosy in the inhabitants of villages bordering Lake Bosumtwi near Kumasi in Ashanti, the specialist medical officer came to the conclusion—based on the discovery of sixty-three lepers among 1,119 patients seen by him—that the incidence of the disease in the area was in the neighbourhood of 6.3 per mille of the total population.

Dr. Dixey gave his opinion that foot yaws and scabies were the common predisposing causes in the region visited and inferred that the consumption of large quantities of decomposing fish by the lake dwellers might give rise to an auto-intoxication.

Some inmates of first Leper Colony started on Gold Coast at Accra in 1921.

Some inmates of first Leper Colony started on Gold Coast at Accra in 1921.

The Senior Sanitary Officer, Ashanti and Northern Territories, pointed out however that the consumption of decomposed fish and the prevalence of foot yaws and scabies was by no means confined to the villagers living around Lake Bosumtwi.

The number of lepers treated at the various settlements is shown in the following table.

TABLE VII.

	Number treated.	Number died.
Tarkwa	4	1
Kumasi	16	1
Accra	64	—
Ho	372	3
Totals	456	5

(*g*) ANTHRAX.

While anthrax in cattle and sheep in the Colony and Ashanti is not infrequently met with and it occurs in sporadic form in cattle throughout the Northern Territories, few human cases are encountered. As in previous years cases were reported from Kintampo where three cases all of which proved fatal, were noted. Inspection of cattle before slaughter and of the carcase afterwards together with the destruction of all carcases found to be infected constituted the chief forms of prevention.

(*h*) RELAPSING FEVER.

The Colony and its Dependencies were free from any serious outbreak of this disease during the year. The epidemic at Suhum in the Colony recorded in the Annual Report for last year was rapidly brought to an end by effective preventive measures. Only sixteen cases occurred during the period under review, one of which proved fatal.

(*i*) TUBERCULOSIS.

It is anticipated that the service of a specially trained medical officer will be available shortly for the investigation of the problem of tuberculosis in the Gold Coast.

Members of the West African Medical Staff are generally agreed that the indigenous African has little or no immunity to this disease and a number are definitely of the opinion that cases are more frequently met with in practice at the present day than hitherto.

In his Annual Report for 1928–29, the Medical Officer of Health, Winneba, writes as follows :—

> " Pulmonary tuberculosis is becoming a serious menace against which little can be done unless the native can be taught that his salvation lies in personal hygiene and sanitary dwelling places."

The Medical Officer of Health, Kumasi, in his Annual Report for the same period writes :—

> " During the year there was a very definite increase in these cases of pulmonary tuberculosis. The majority were in labourers recently from the Northern Territories.
>
> " The mortality rate of the disease was very high. Dust and starvation are probably potent predisposing causes and occurring on the way down to Kumasi and overcrowding undoubtedly helps to spread it here.

> " The whole problem is beginning to assume serious proportions in this relatively non-immune population."

He points out that the ratio of deaths from tuberculosis to the total deaths has risen from six in 1926–27 and 5·1 in 1927–28 to 13.4 in 1928–29.

Table VIII illustrates the incidence of the disease at some of the larger centres.

TABLE VIII.

	Deaths from all forms of tuberculosis.		Percentage of deaths from tuberculosis to total deaths.		Increase or decrease during 1928–29 over previous year.	
	1927–28.	1928–29.	1927–28.	1928–29.	Number.	Percentage.
Accra	91	85	7·3	6.6	— 6	— 0.7
Cape Coast ..	40	28	12.3	8.1	— 12	— 4.2
Sekondi ..	54	49	16.6	17·5	— 5	+0.9
Tarkwa	57	48	30.0	39·3	— 9	+9·3
Koforidua ..	14	13	6.5	6.5	— 1	—
Kumasi ..	31	62	5·9	11.0	+31	+5·1

(*j*) YAWS.

This condition is responsible for a very large amount of suffering in the Gold Coast and its Dependencies. Out of some 35,533 cases of sickness treated in the five Welfare Clinics during the year under review 10,622 or 29.8 per centum were attributed to yaws. There was a notable reduction in the number of cases of yaws attending for treatment at the Christiansborg Centre.

The reasons advanced to account for this satisfactory state of affairs were that the treatment of a large number in the past has resulted in a diminution in the infected foci while the actual means of infection were reduced by the slow but steady improvement in the sanitary conditions, refuse disposal and water supplies of the villages in the country round Accra.

Yaws is still more common in the Northern Territories.

The Medical Officer, Zuarungu, writing of the disease in his Annual Report stated as follows :—

> " This is common and is the disease with the greatest incidence judged by those treated (493).
>
> " The numbers rose from 8-10 in the early months to over 80 in the later months so that it is probably commoner than the figures suggest ".

Preventive measures against the disease include the treatment of cases and general sanitation—attention to water supplies, refuse disposal and so on.

3.—Helminthic Diseases.

(*a*) ANKYLOSTOMIASIS.

This disease is fortunately not of great importance from an epidemiological standpoint since the percentage infection of the community is apparently small in contrast with the high rate of infection in some other helminthic diseases.

Efforts are made to secure the provision of an adequate number of latrines both of a permanent and a temporary nature to obviate fouling of ground as far as possible.

(*b*) DRACONTIASIS.

This disease is met with for the most part in the Northern Territories but also occurs in areas where the water supply is poor and consists largely of pools and ponds.

Apart from the treatment of individual cases, preventive measures consisted largely in stimulating the interest of chiefs and headmen in the prevention of contamination of the drinking water supplies of their townships.

The policy of providing and protecting village water supplies was pursued with admirable energy in Ashanti where the principles of sanitation are better understood and appreciated than in other parts of the Gold Coast.

(*c*) ASCARIASIS.

While there is ample evidence to show that infection with ascaris is common, more especially among the more primitive sections of the community, it is doubtful whether infection gives rise to obvious symptoms in the majority of persons.

While persons found to be suffering from the disease receive appropriate treatment, the chief preventive measures taken against this disease, more particularly in the more populous areas, depend upon securing as satisfactory a method as possible for dealing with nightsoil and refuse.

(*d*) TAENIASIS.

This is the most common helminthic infection treated in the hospitals and dispensaries.

The Medical Officer, Zuarungu, referring to this disease in his Annual Report revealed a serious state of affairs :—

> "This is the second commonest disease (46 cases). It threatens to remain the commonest. Its incidence is probably so great because in these over-populated parts, firewood is very scarce and meat is consequently undercooked.
>
> "The most important factor however is that some 250,000 people defæcate without a latrine amongst them".

Since meat inspection is, perforce, chiefly confined to the large towns where personnel of the Sanitation Branch is available and since fouling of grazing ground is common in the rural areas where infection of cattle and swine is continually occurring, it is not to be wondered at that this disease is so frequently met with.

Preventive measures are directed towards educating the general public to appreciate a satisfactory type of nightsoil disposal system and toward securing the provision of slaughter houses and of the inspection of meat before consumption.

(*e*) SCHISTOSOMIASIS.

Bilharzia is much less commonly met with than the other forms of helminthiasis described above.

The returns from hospitals and dispensaries for 1928–29 showed that a total of 236 cases had been treated in the out-patient department or as in-patients.

Writing of this disease in his Annual Report for his district, the Medical Officer, Akuse, stated as follows :—

> " Twenty one cases were seen during the year and without exception they came from villages on the River Volta below Akuse. The villages infected are Assuchari and Osuduko. One case was reported from Amedica. The patients invariably declare themselves to be suffering from gonorrhœa.
>
> " The results of treatment by antimony were excellent".

Preventive measures against this disease were similar to those described under " Ankylostomiasis ".

4.—Animal Diseases.

Livestock imported during 1928–29 from the Northern Territories into Ashanti for consumption in Ashanti and the Gold Coast Colony numbered as follows :—

TABLE IX.

Importing Station.	Cattle.	Sheep and Goats.
Yeji	33,165	33,224
Bamboi	8,972	8,109
Buipe	2,391	23,808
Krachi	2,194	2,598
Total	46,722	67,739

Small herds of humped cattle are imported under unsatisfactory conditions from Lagos and are inspected at the port of entry in the Gold Coast.

Rinderpest again appeared in various parts of the Colony and measures had to be taken to prevent the introduction of infected herds from neighbouring French territory.

It was found necessary by Proclamation No. 5 of 1928 to apply the provisions of the Diseases of Animals Ordinance to the whole of the Gold Coast Colony.

In February, 1929, owing to an extensive outbreak of rinderpest in the Accra, Akwapim, Keta-Ada and Volta River Districts, such areas had to be declared infected by Order by the Governor No. 7 of 1929. In addition, the Basari-Krachi cattle route was closed and the movement of cattle across the frontier from French Mandated (Togoland) Territory was prohibited.

Considerable use is made of serum obtained from the French research institute at Bamako.

The presence of anthrax was discovered in small groups of cattle and sheep. The disease is widespread in cattle over the whole of the Northern Territories.

Fresh supplies of Sclavo's anti-anthrax serum were kept available in case of emergencies, one of which arose when a case of human anthrax was reported from Tamale towards the end of the period under review.

The following extracts from the Annual Report of the Medical Officer of Health, Tamale, have a bearing on the subject :—

> " Ten carcases (bovine) were condemned owing to heavy infestation with " cysticercus bovis " (measly beef). About 25% of the bovine carcases were infected in varying degrees with cysticercus bovis.

Part of the New Contagious Diseases Hospital at Cape Coast

The New Night-Soil Tipping Depot at Cape Coast

" When there were very few cysts they were excised, a most minute inspection of the carcases made and then the carcases allowed to go on the market.

" About three quarters of the number of animals slaughtered were reared locally, the other quarter being imported from the Haute Volta. 527 head of cattle, 2,099 of sheep, 1,713 of goats, and 3 pigs were slaughtered and inspected during the year ".

Reports from Accra and Kumasi regarding cysticercal infection are given in tabular form below.

TABLE X.

	Cattle infected with C. Bovis.		Percentage Infected.		Swine infected with C. Cellulosae.		Percentage Infected.	
	1927–28.	1928–29.	1927–28.	1928–29.	1927–28.	1928–29.	1927–28.	1928–29.
Accra	58	20	2.8	0.7	981	890	23.3	19.8
Kumasi ..	118	57	6.2	2.5	5	6	1.5	3.2

Cattle and pigs slaughtered in Accra come chiefly from grazing grounds between Accra and Keta and it is a well-known fact that the sanitary condition of many of the villages in the Keta District are amongst the most unsatisfactory in the whole Colony.

Referring to cattle suffering from trypanosomiasis, the Medical Officer of Health, Tamale, in his Annual Report stated as follows :—

" Most of the imported Zebu cattle examined were found to be infected but no case was found amongst the native cattle.

" Several horses were treated for the disease and as before tartar emetic treatment proved efficacious.

" There was a serious outbreak amongst the donkeys used for work at the local school. It was found that nearly all were affected, and it is presumed that the disease only becomes manifest when the constitution of the animals is weakened by some other factor ".

4. Seasonal Prevalence of Diseases.

The seasonal prevalence of diseases is by no means marked in the Gold Coast. An increase in the number of deaths from diseases of the respiratory system occurs in December and January as the result of the cold and dusty Harmattan wind. Officers of the department posted to stations in the Northern Territories state that dracontiasis is more commonly met with in the wet season but as the period which has to elapse between the date of infection and the date of manifestation of the disease amounts to six months or longer, it would appear to be reasonable to suppose that infection occurs when water is scarce and more highly contaminated.

The statistics available illustrating the incidence of dysentery and malaria afford no means of establishing any seasonal influence.

II.—General Measures of Sanitation.

(a) SEWAGE DISPOSAL.

The system of water-carriage latrines at Korli Bu and at Achimota continued to give satisfaction although the misuse of certain of the public latrines at Korli Bu necessitated whole lengths of pipe having to be broken open, cleared of sticks, stones and corn-cobs and replaced.

It will be some time before the mass of illiterate people are educated up to the correct use of public water-carriage latrines.

It is realised, however, that the time has come when a pan-system of latrines with removal of nightsoil by head-load or by lorries through crowded highways can no longer be tolerated.

For rural areas smoke pit-latrines have been found to be the most suitable type when adequate sanitary supervision is available, otherwise the modified type of fly-proof Salaga latrine would appear to give great satisfaction.

To overcome the difficulties met with in constructing pit latrines in sandy or rocky localities, experiments are being carried out on a modified septic tank.

(*b*) SCAVENGING AND REFUSE DISPOSAL.

In all the larger townships in the Colony and its Dependencies a system of motor lorries for refuse removal functioned during the period under review. A service was inaugurated in Tamale and the Medical Officer of Health for that town reported thereon as follows :—

> " Since March 1st, 1929, and the arrival of three conservancy lorries the entire work, with the exception of the Sanerigu Ridge, has been taken over by the Sanitation Branch. A new farm has been opened, deeper trenching than hitherto is employed and the results are infinitely more satisfactory. The work is done much more rapidly and a much greater standard of cleanliness has been possible ".

Indestructible refuse is found to serve as good material for filling in low-lying areas.

Where incinerators do not exist refuse is dumped in marshy areas and then fired and covered with a top dressing of earth or sand.

While many mosquito-breeding areas in and around large towns have been successfully dealt with in this way, there is an obvious objection to this method owing to the danger of fly-breeding and rat-harbourage and bad odours arising from the decomposition of organic matter in the refuse deposited without prior effective incineration.

To meet this objection numbers of field incinerators have been built throughout the Colony as a temporary expedient until all the more populous centres can be equipped with high temperature destructors.

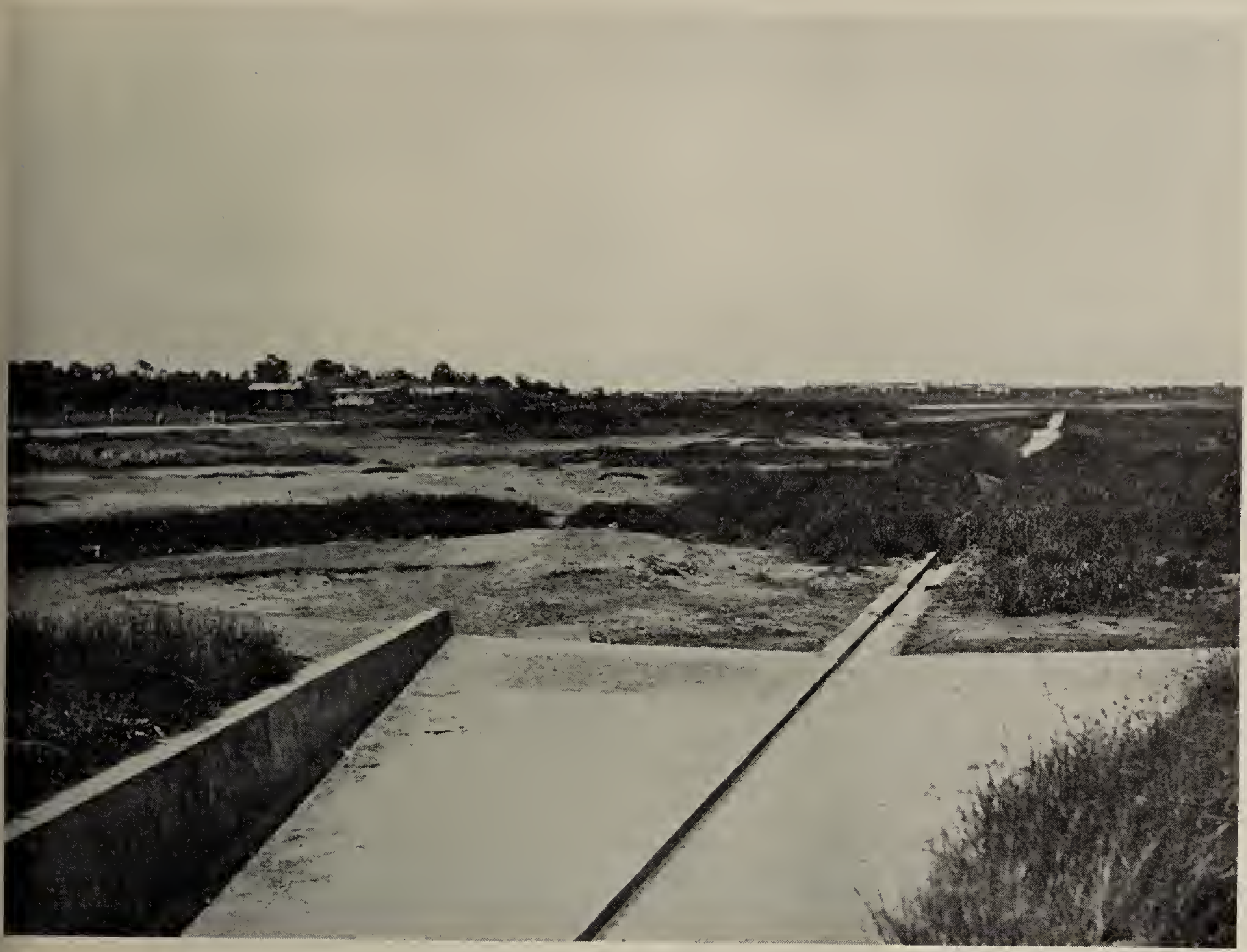
One such destructor costing rather over £6,000 should be functioning in Accra towards the end of the year.

(*c*) DRAINAGE.

Routine draining of marshy areas in and around the larger towns by means of earth channels was carried out under the supervision of officers of the Sanitation Branch.

A very satisfactory start was made upon the draining and reclamation of the Korli lagoon at Accra. This scheme will have a far-reaching effect upon the general health and comfort of the people of Accra and at the same time will result in the acquisition of hundreds of acres of park land and additional building sites.

Excellent progress was also made in the drainage of the low-lying areas within the Kumasi towns boundaries.



Accra. Ends of No. 2 Main Drain and Drain South of Causeway.

Effluents are to be pumped by rising Main into Sea.

Owing to the misuse of surface water drains as open sewers in Accra with the resulting pouring out of malodorous waste into the Korli lagoon, a scheme has been devised to connect up the ends of the main drains with a view to collecting all but storm-water in screened septic tanks and pumping the resultant sewage by a rising main into the sea.

(*d*) WATER SUPPLIES.

The outstanding events in the year in connexion with water supplies were the opening of the pipe-borne supply for Cape Coast by His Excellency the Governor in December, 1928, and the completion and approval of the scheme for Kumasi.

The Kumasi scheme which is estimated to cost about £250,000 provides for water to be obtained from the Owabisu situated about seven miles to the north-west of Kumasi.

A start was made on the provision of a large reservoir having a capacity of one million gallons on high ground about three miles from Accra on the west side of the Dodowa Road.

The results of the bacteriological examinations of the water supplies at Accra and Sekondi and other details are given in the appendix to this report.

It will be noticed that the standard of purity of the samples of water taken at Sekondi and Takoradi was considerably lower during the period under review while the Accra supply was entirely satisfactory.

The need for a satisfactory water supply at Koforidua is a very real one and the same applies to many other populous centres in the Volta River District.

Tamale is another centre where an adequate and satisfactory water supply is very desirable.

Much useful work is being done in Ashanti where this department initiates or improves water supplies while working on village layouts—the chiefs and their peoples supplying stone, cement, sand and unskilled labour.

It is to be hoped that a special staff of, say, four expert hydraulic engineers will be available before long to travel through the Colony to investigate and advise on local water supplies for townships too small to warrant elaborate water works and pipe-borne water.

Thanks to the increased sanitary personnel sanctioned during 1928–29 it was found possible to devote considerably more time to this branch of health work.

The apathy of the inhabitants of rural areas in the matter of adequate and pure water supplies is astonishing. In some localities the people are willing to walk miles daily for water which is hardly good enough for washing purposes much less for drinking or cooking.

(*e*) OFFENSIVE TRADES.

Offensive trades are of little public health importance in the Gold Coast.

The curing of hides is carried on on a small scale and instruction is given in the flaying of carcases.

Fish curing is a nuisance in certain Coast towns and has to be the subject of legislative control.

(*f*) CLEARANCE OF BUSH AND UNDERGROWTH.

This is carried out as often as funds permit in the principal towns and chiefs and headmen of towns not under the Towns or Ashanti Administration or Northern Territories Administration Ordinances are induced to carry out their responsibilities in this direction as far as possible.

(*g*) SANITARY INSPECTIONS AND PROSECUTIONS.

Figures in respect of the above are given below.

TABLE XI.

	Premises Inspected.	Larvæ Found.	Fines for Larvæ.	Insanitary Conditions, etc.	Fines for Insanitary conditions, etc.
			£ s. d.		£ s. d.
Accra	168,405	1,202	652 15 0	2,909	810 3 6
Kumasi	61,850	895	271 2 0	2,964	933 17 9
Cape Coast	54,251	539	265 14 6	279	112 2 6
Sekondi	48,530	274	115 2 6	408	113 17 0
Koforidua	39,545	254	151 0 0	630	284 2 6

The aggregate number of house-to-house inspections carried out at all stations during the year amounted to 714,616 as compared wtih 632,847 in 1927–28 and 620,351 in 1926–27.

There can be no doubt that the sanitary condition of premises in towns subject to constant supervision of officers of the Sanitation Branch has undergone a very considerable improvement in the last decade.

The improvement, however, is not manifest in outlying townships not subject to the same constant supervision.

III. SCHOOL HYGIENE.

It is a matter of regret that the condition of many school premises and surroundings leaves so much to be desired.

The following extracts from the Annual Reports of various medical officers of health have a bearing on this question :—

KOFORIDUA.

> " All are overcrowded, lack adequate ventilation and latrines The desks vary in size and are not standard. Several cases of faulty posture have been noted during the medical examination ".

WINNEBA.

> " For the most part the school-rooms are overcrowded, containing three or four classes vying with each other in vocal efforts ".

KIBI.

> " The inadequacy of the sanitary structures has been brought to the notice of the Education Authorities ".

The teaching of hygiene as part of the curriculum under such conditions would appear to lack effectiveness.

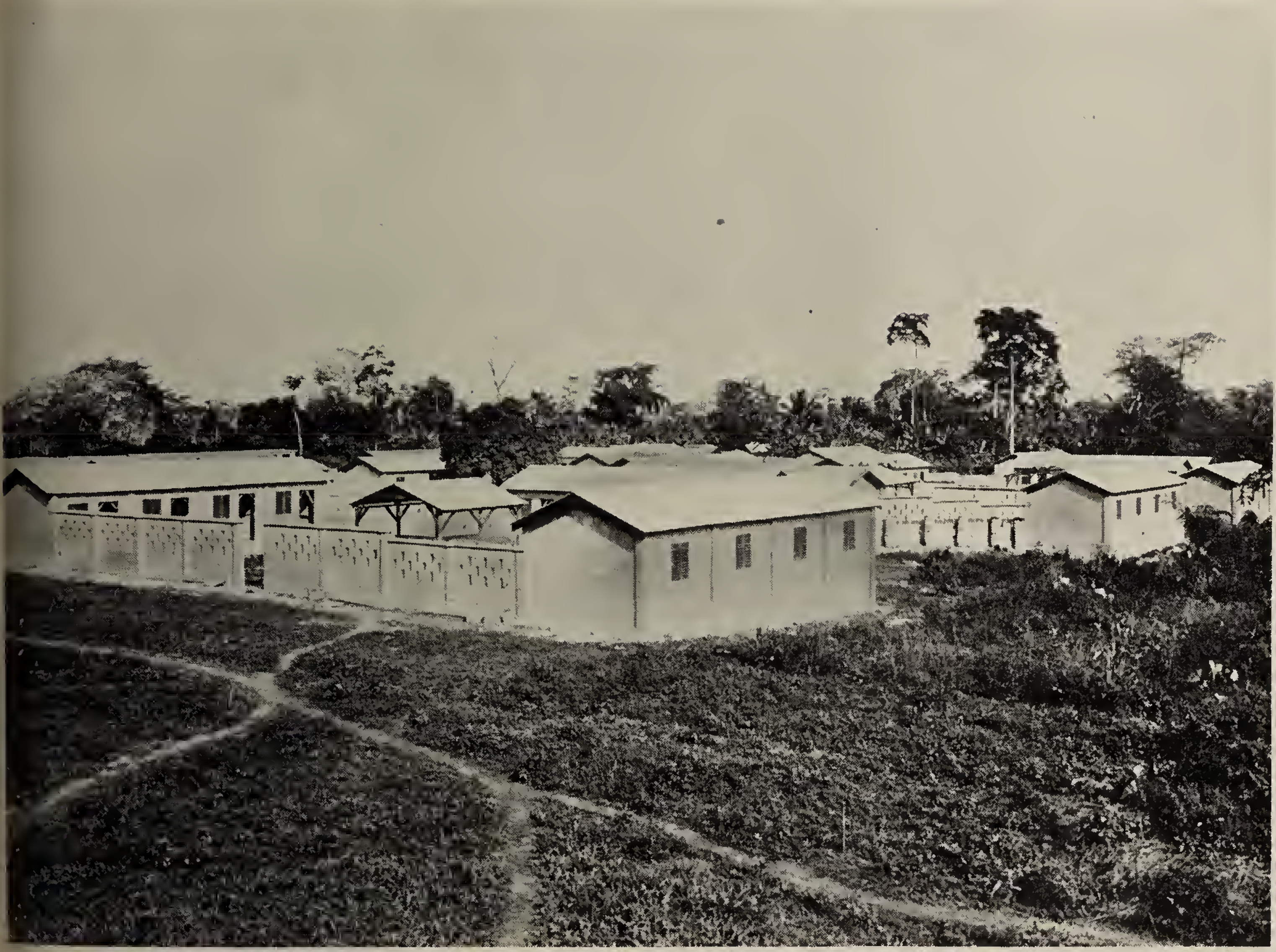
Medical Officers in charge of Welfare Centres continued to devote a portion of their time to the medical examination of groups of school children but, with one or two exceptions, the pressure of work in the infant and ante-natal departments has now reached such dimensions as to render the devotion of an adequate period each day to school medical work a matter of great difficulty.

Christiansborg Clinic. Christiansborg Maternity and Child Welfare Centre.

Cape Coast Clinic. Cape Coast Maternity and Child Welfare Centre.

Sekondi Clinic. Sekondi Maternity and Child Welfare Centre.

Shama Clinic. Shama Child Welfare Centre.



Kumasi. Extension to New Zongo.

When the training of the staff of health visitors has been completed it should be possible to secure the following-up of all cases of school children found to be suffering from defects at the periodical medical examinations.

Table XII summarises the defects found at medical examinations carried out at four Welfare Centres.

TABLE XII.

	Total Number of Scholars.	Total Number Defective.	Percentage Defective.	Spleen.	Heart.	Lungs.	Debility.
Accra	634	362	57.0	18.9	4.8	2.8	1.4
Kumasi	882	649	73.5	27.5	4.5	3.8	7.8
Sekondi	548	350	63.8	22.8	1.8	0.3	—
Cape Coast	1,069	364	34.	1.8	1.4	0.7	—
Achimota	90	82	91.1	57.7	1.1	4.4	—

	Skin.	Mouth and Teeth.	Throat and Tonsils.	Ears.	Eyes.	Glands.	Nervous System.	Deformities.	Unvaccinated.	Yaws.
Accra	12.4	12.9	15.1	1.1	5.2	15.7	0.3	10.2	41.0	5.6
Kumasi	18.8	13.0	22.1	0.3	0.9	67.6	—	9.2	14.2	18.1
Sekondi	3.2	22.0	2.7	—	7.4	24.2	—	1.4	19.5	0.3
Cape Coast	3.6	10.5	4.3	1.1	2.2	3.9	—	3.1	17.4	0.4
Achimota	13.3	32.2	3.3	1.1	1.1	62.2	—	—	23.3	6.6

Table XIII gives the attendances at school clinics for the treatment of minor disorders.

TABLE XIII.

	1927–28.	1928–29.
Christiansborg	888	2,152
Sekondi	7,542	3,274
Chama	—	1,426
Cape Coast	—	281
Achimota	—	5,596

IV. Labour Conditions.

With the closing down of the Tarkwa and Abbontiakoon Mines during the year, the amount of indentured labour employed in the Gold Coast showed a considerable decrease. Indentured Kroo labour employed in connexion with municipal conservancy work is becoming less year by year.

In spite of the fall in the price of cacao recorded during the period under review, large numbers of labourers continue to immigrate south from the Haute Volta and French Niger Territory for work in the Colony. Albert Londres, French special correspondent, alleges, that 600,000 Africans have made their way to the Gold Coast in the past three years from French West and Equatorial Africa.

Some 517 immigrant Kroo labourers and 11,255 passengers were medically examined on disembarkation at the quarantine station on the Accra beach, while 2,363 immigrants were examined on landing at Sekondi, during the period under review.

V. Housing and Town Planning.

It is again necessary to report that little work has been carried out under the provisions of the Town Planning Ordinance of 1925, and the opinion is generally shared that this enactment is not well adapted to overcome the difficulties arising from the customs relating to land tenure in this Colony.

It would appear to be desirable to introduce a somewhat more simple form of legislation to meet local conditions which are so dissimilar from those in England.

In spite of this, however, a number of layouts were drawn up and approved by the Central Health Board including several comprising large areas on the outskirts of Accra. The continuation of the town planning scheme for Kumasi proceeded satisfactorily and the administrative centre of the Colony of Ashanti should soon be entitled to be described as the finest and best laid out town in the whole of British West Africa.

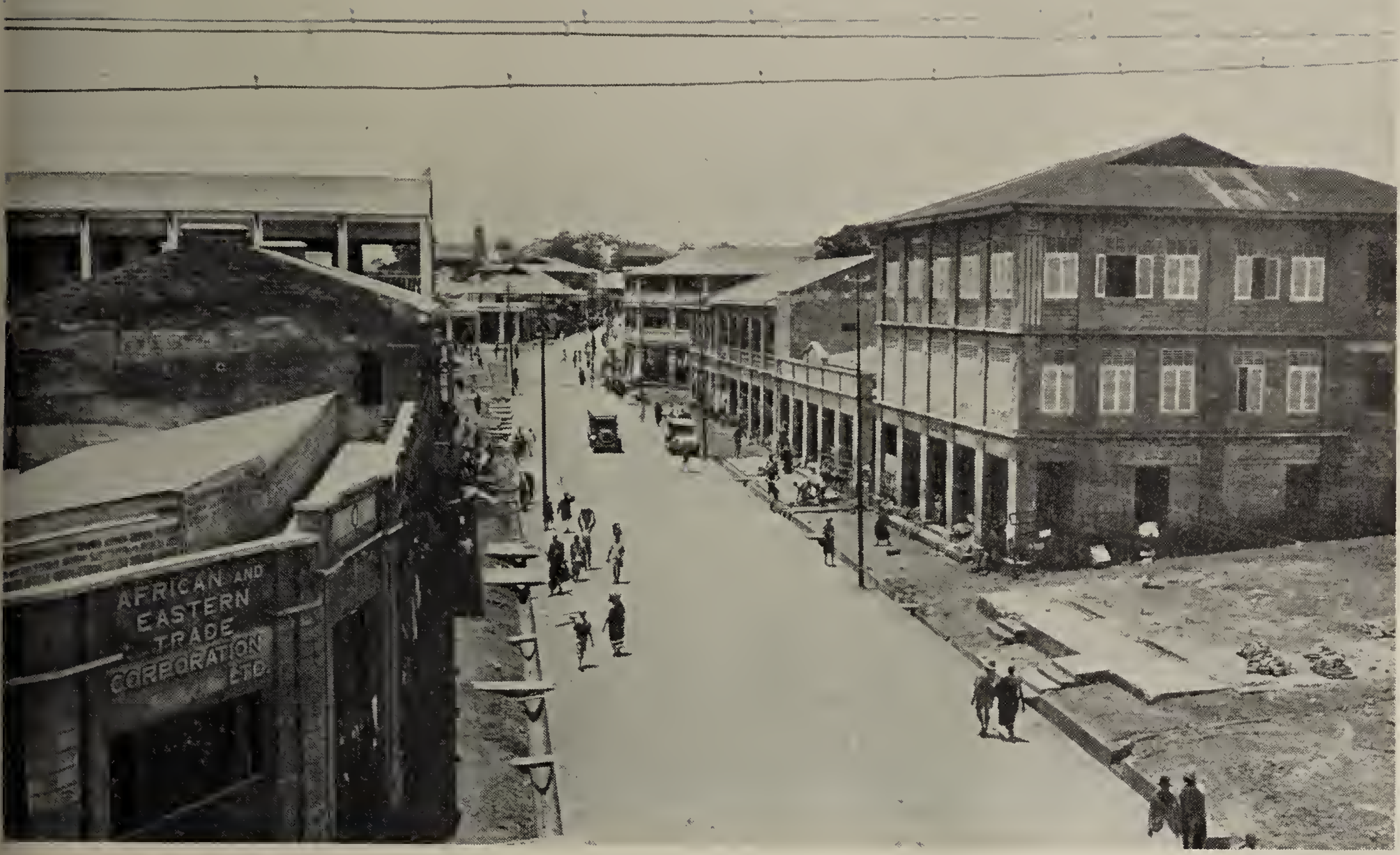
The layout of villages in Ashanti continued to progress satisfactorily.

As many as one hundred and twenty-four village layouts were in process of being carried out during the year. It is regretted that the appreciation of and assistance given in connexion with village sanitation by the people of the Eastern Province of the Colony, to which a number of village overseers trained in Ashanti were sent during the year, is very discouraging.

This is more regrettable when it is realised that the proportion of literates is considerably higher in the Eastern Province of the Colony than in Ashanti.

Referring to this subject in his Annual Report, the Medical Officer of Health, Sekondi, wrote as follows :—

> " The housing congestion has been relieved to a less extent than might have been supposed by the transfer of more than a thousand labourers to Takoradi, but it is all to the good that most of the plague-inviting lodgings of imported labourers now stand empty or at least decongested.
>
> " The new buildings completed during the year number only six, but seventeen structures put up without permission and without regard to hygienic considerations have been demolished on threat of proceedings. Several unfinished houses of more than one storey remain untouched, lack of funds being pleaded, the result too commonly being that passers-by in a hurry use them as latrines.
>
> " Vigilance is necessary to defeat the habitual attempts made to deviate from the plans as passed. The closing-in and partitioning of open verandahs, so that more small apartments, of insufficient area and ventilated, if at all, though a neighbouring bed-room may be a source of further revenue, is a common device. That it is so frequently essayed shows the demand for living accommodation.



Kingsway, Kumasi. Rebuilding of old Town—Town-Planning Scheme.

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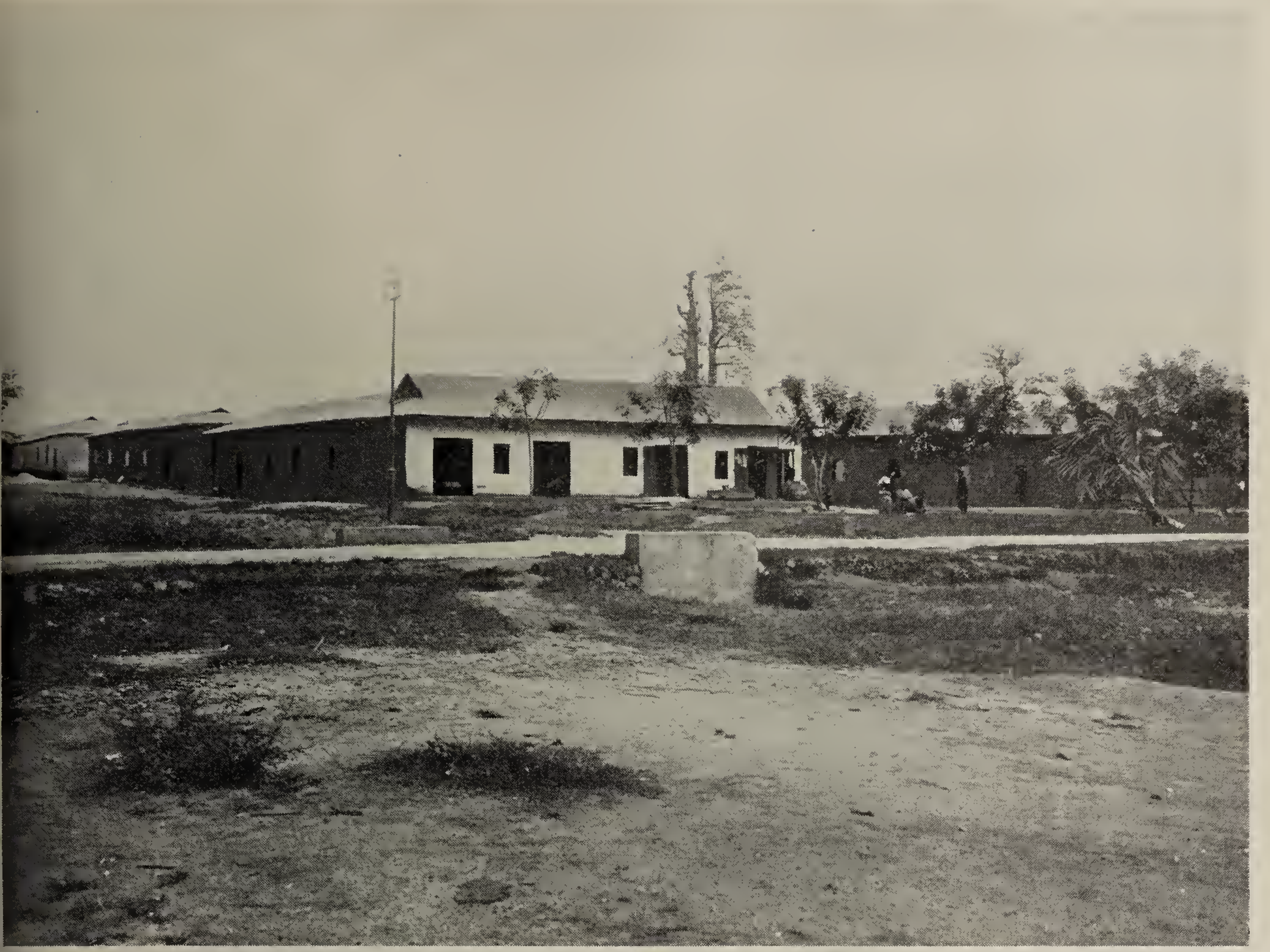
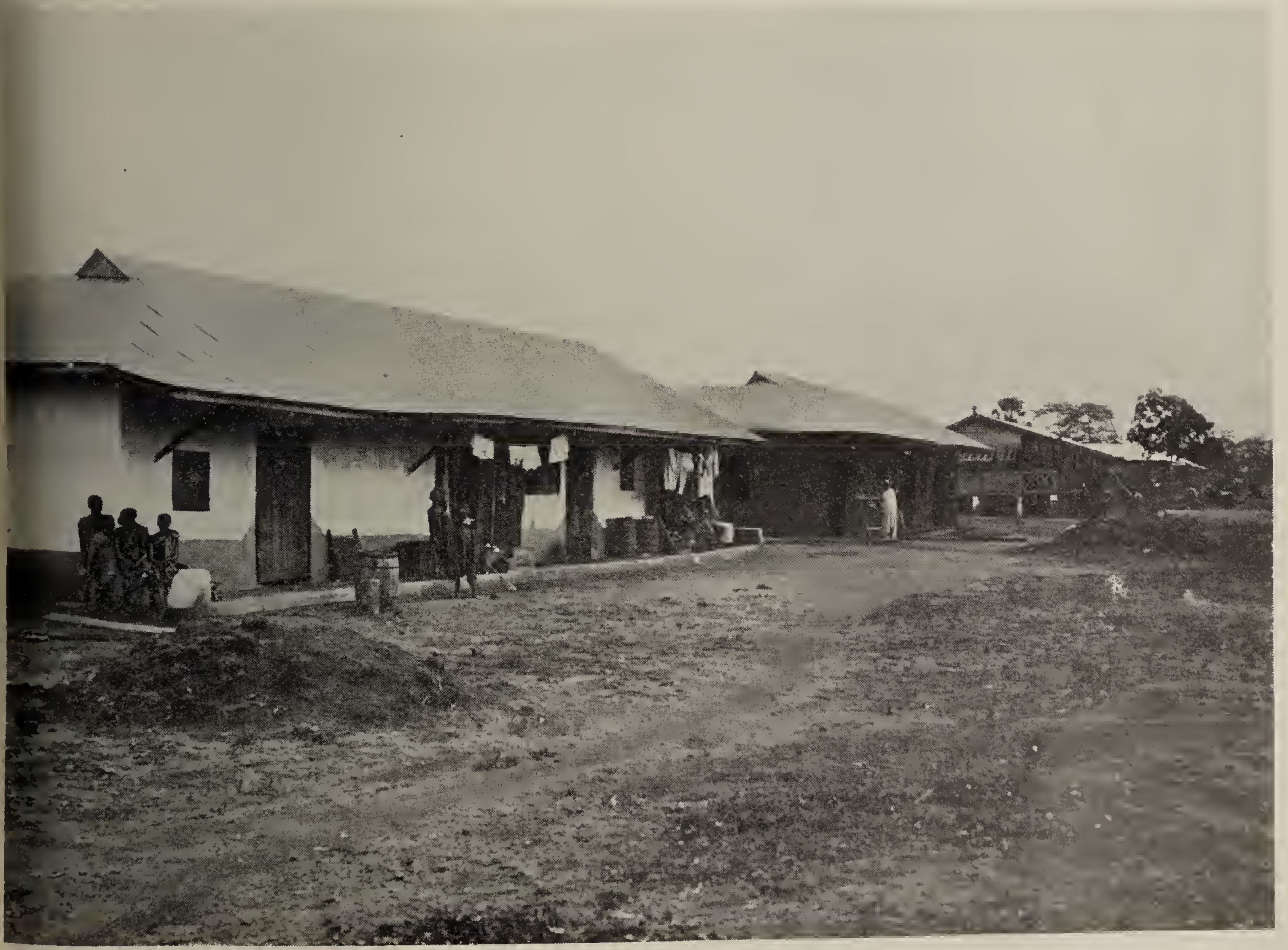


Mampontin, Ashanti. Layout under construction.

Note straight street lines, spacing of houses of good, solid swish construction.



Manso-Nkwanta, Ashanti. Layout in course of construction.

Note overhanging roofs encouraged in African dwellings instead of verandahs, the latter where existing being invariably enclosed and subdivided, rendering house insanitary.

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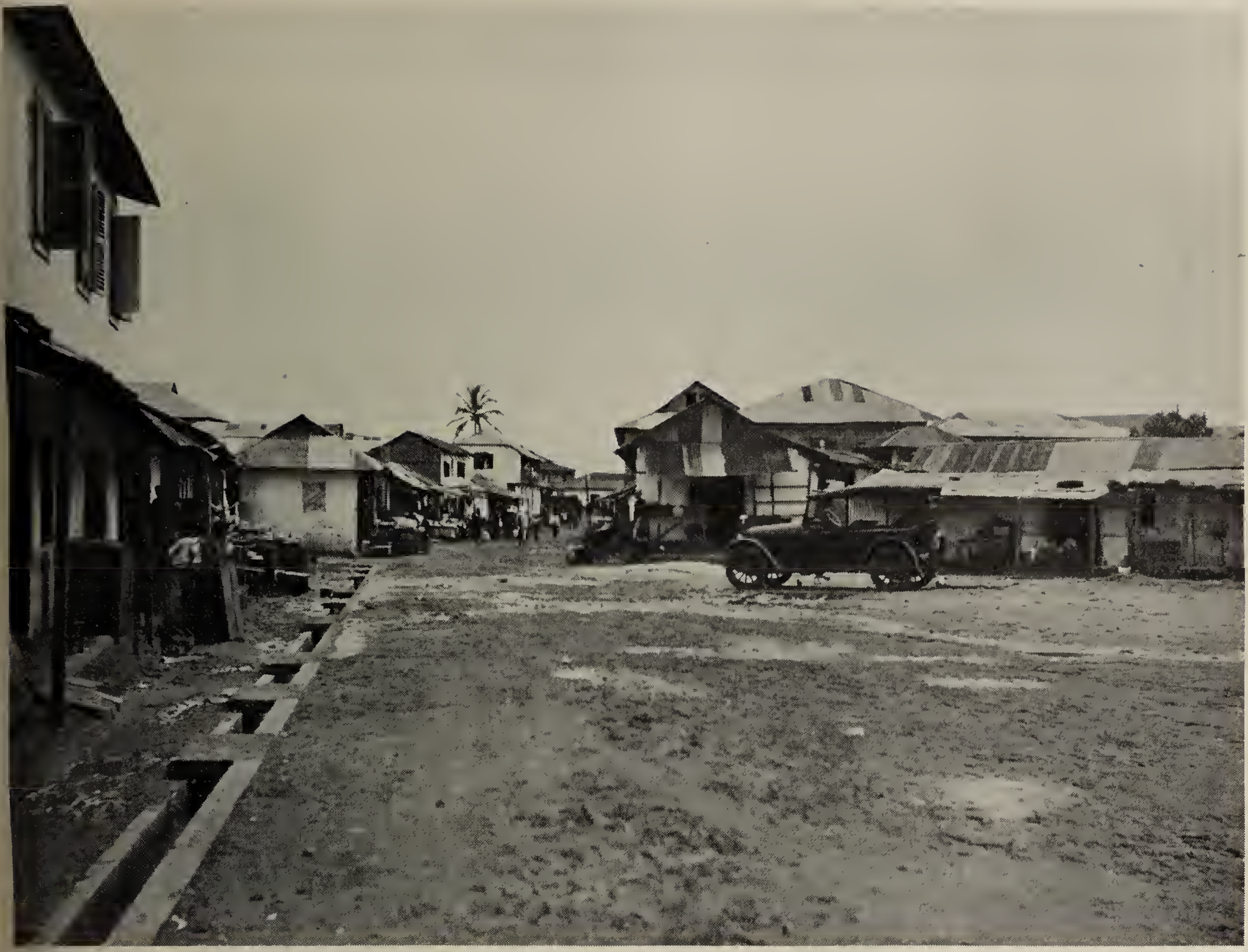
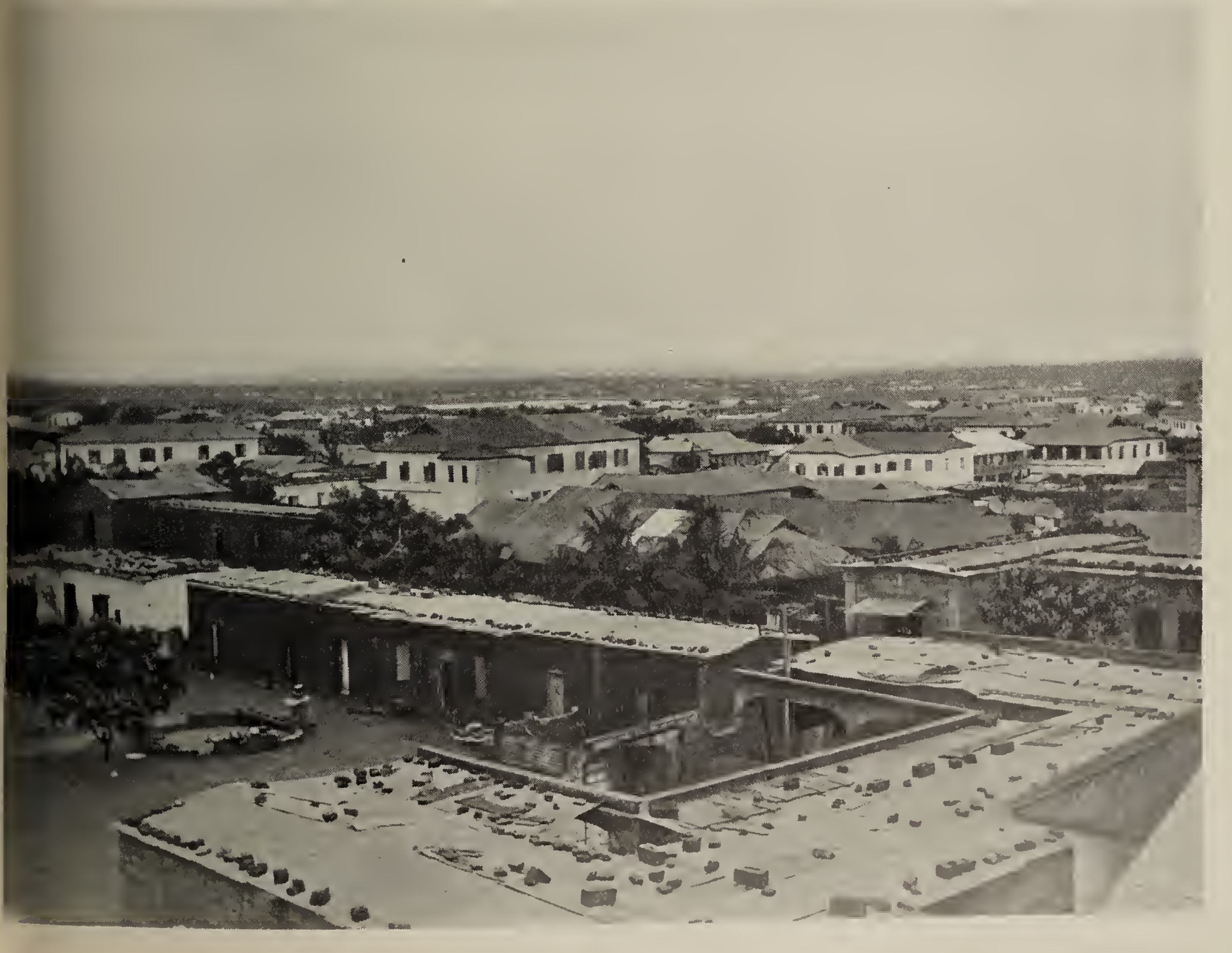


Accra. Congested Area.
Note Insanitary Shacks



Accra. Riponsville.
Note preponderance of Good Type Dwellings.

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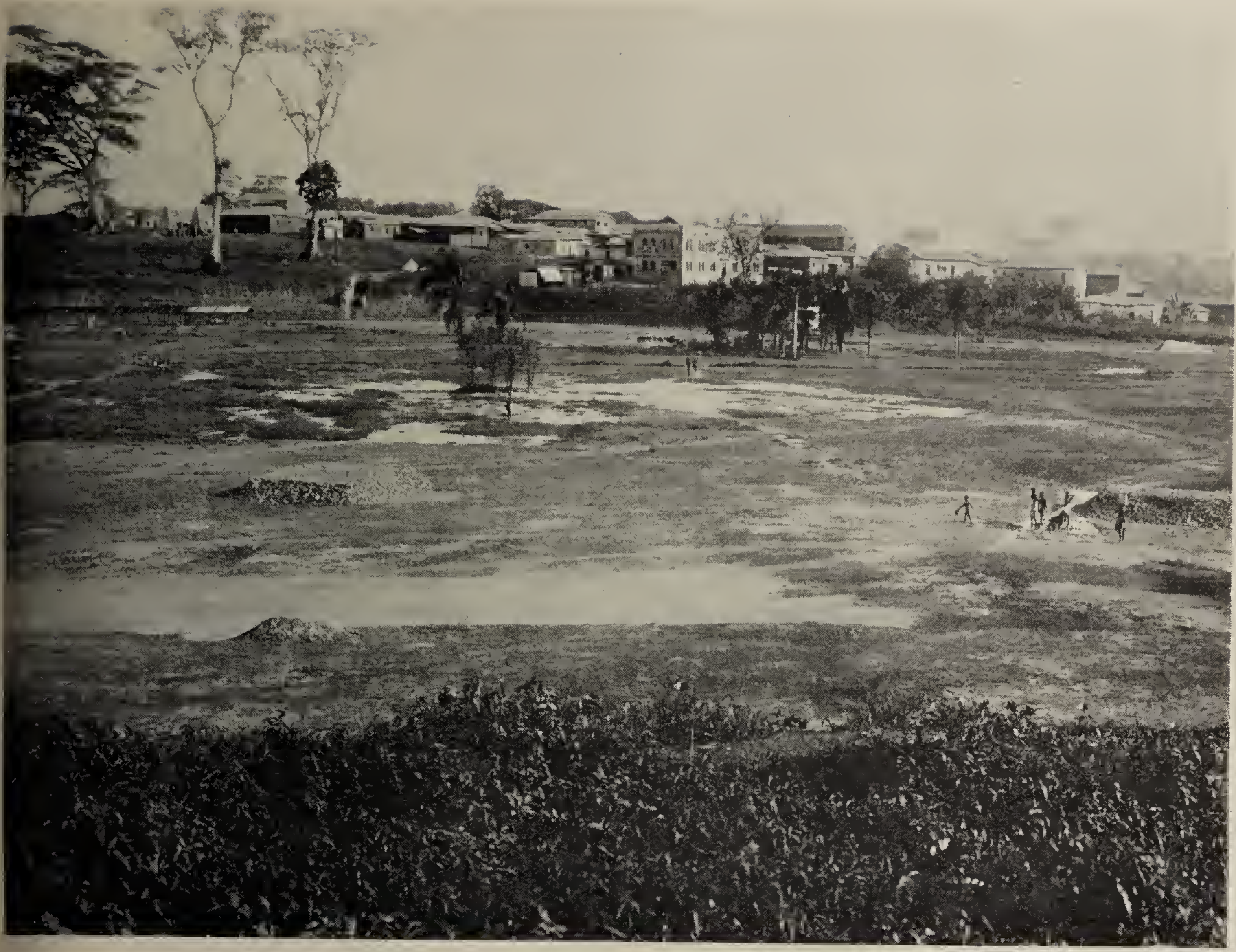
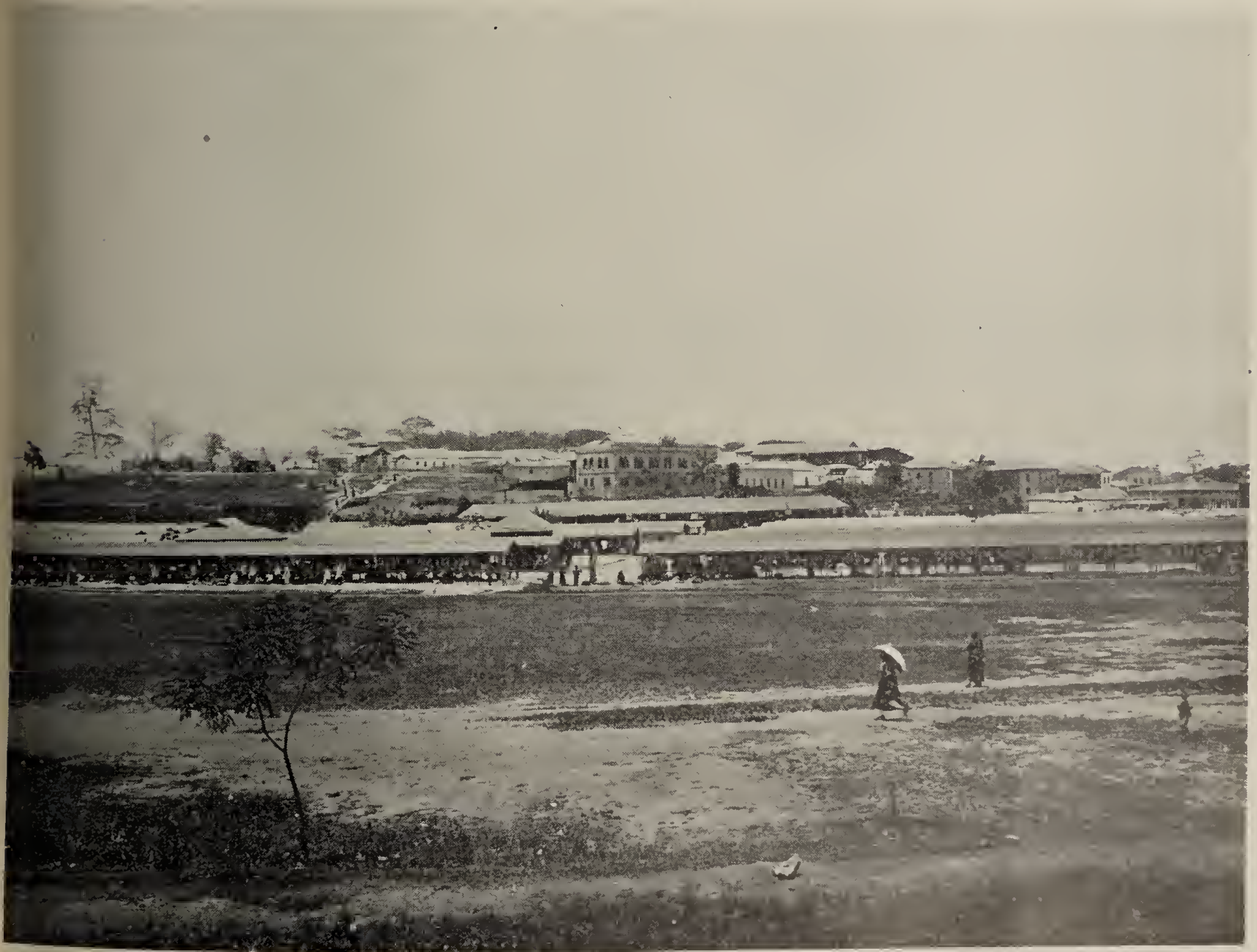


Kumasi. Commencement of Market on filled-in Swamp, 1925.



Kumasi Market, 1928.

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"On the other hand the slowness of the legal machinery available and the pertinacity and skill revealed in adducing pleas for a little further delay render the whole problem of housing amelioration somewhat discouraging. The facile demolitions referred to above were practically all cases of 'small men' and valueless erections".

An admirable village layout was carried out in the grounds of the Prince of Wales College, Achimota, during the year.

VI. FOOD IN RELATION TO HEALTH AND DISEASE.

The change in the dietary of a portion of the population from native grown food-stuffs to one consisting largely of tinned foods has not been attended so far by any obvious general physical deterioration.

Commenting on this change in his Annual Report, the Medical Officer of Health, Sekondi, stated that it is one of " civilization's least desirable gifts. Perhaps the African did not formerly obtain enough protein in his native diet, but the little which he did obtain, was doubtless not purged of its vitamins ".

Six deaths from beri-beri and six from rickets constituted the only evidence of the existence of deficiency diseases, and the ratio of these twelve fatal cases to the 5,109 deaths recorded in 1928-29, from the twenty-six registration areas being 0.2 per centum.

INSPECTION AND CONTROL OF MARKETS, ETC.

Markets.

Periodical inspections of markets were carried out during the year.

Prosecutions to the number of fifty were undertaken in respect of the sale or exposure for sale of unwholesome food and these resulted in the sum of £53 4s. being collected in fines.

The control of hawkers was a matter of serious concern to the health authorities of the larger townships. Where adequate market accommodation is available there can be no legitimate excuse for the presence of groups of hawkers in dusty and crowded thoroughfares, exposing foodstuffs for sale in close proximity to public latrines, dustbins, stables, drains and the like ; moreover, the danger to health from fly-contamination at such sites is too obvious to call for emphasis.

It is a matter of regret that the health authorities receive little or no support from the general public in their efforts to rid towns of this nuisance and danger. A common fault made almost everywhere in the Colony lies in the allocation of market stalls to vendors of beads, cloths and dry goods instead of to the vendors of foodstuffs for which markets are primarily provided.

Slaughterhouses.

Slaughterhouses were inspected at frequent intervals during the year.

Many quite large townships do not, however, possess slaughterhouses or even slaughter slabs and it is desirable that this deficiency should be made good in the interests of public health.

Areated Water Factories.

These are regulated by bye-laws in certain towns. They were kept under surveillance during the period under review as far as possible.

B. MEASURES TAKEN TO SPREAD THE KNOWLEDGE OF HYGIENE.

Hygiene is taught in the schools and practical value is given to such teaching during the year by encouraging pupils to take an active interest in the sanitary condition of schools and their surroundings and to co-operate in " Health Days ", " Health Weeks ", etc.

" Health Weeks " were held at Oda, Cape Coast, Ada, Keta and Koforidua, while monthly " Health Days " were held at Accra and Ho during the year with satisfactory results. Members of the Gold Coast League for Maternity and Child Welfare continued to perform an excellent service to the community by carrying out large numbers of domiciliary visits at which lessons in personal and domestic hygiene were brought home to the occupants of premises visited.

The Medical Officer of Health of the Cape Coast district gave a series of lectures to Tribunal Registrars which were well attended.

Friendly talks on hygiene, personal and communal, took place between the Medical Officer of Health, Winneba, and the Omanhene, his sub-chief and citizens of the town. In Ashanti, the officers of the department supervising village sanitation and layouts took every opportunity of bringing home to the people of the villages the value of healthy houses and surroundings.

In several instances inhabitants of villages applied for advice and, where staff was not immediately available, they commenced work on clearing and improving their villages spontaneously—a very gratifying feature.

Excellent educational work was carried out by the scholars of the Prince of Wales College, Achimota, who visited villages in the Accra district within a twenty miles radius and helped the inhabitants to an appreciation of the desirability of a clean and sanitary village.

C. Training of Sanitary Personnel.

A start was made in bringing newly appointed Superintending Sanitary Inspectors into Accra for a three weeks course of instruction. This proved of considerable value.

A special training officer was employed at the Training School in Accra for giving practical and theoretical training in hygiene to the junior members of the sanitary staff.

The course of training lasts over a period of three years after which the personnel is drafted to out-stations for duty.

D. Recommendations for Future Work.

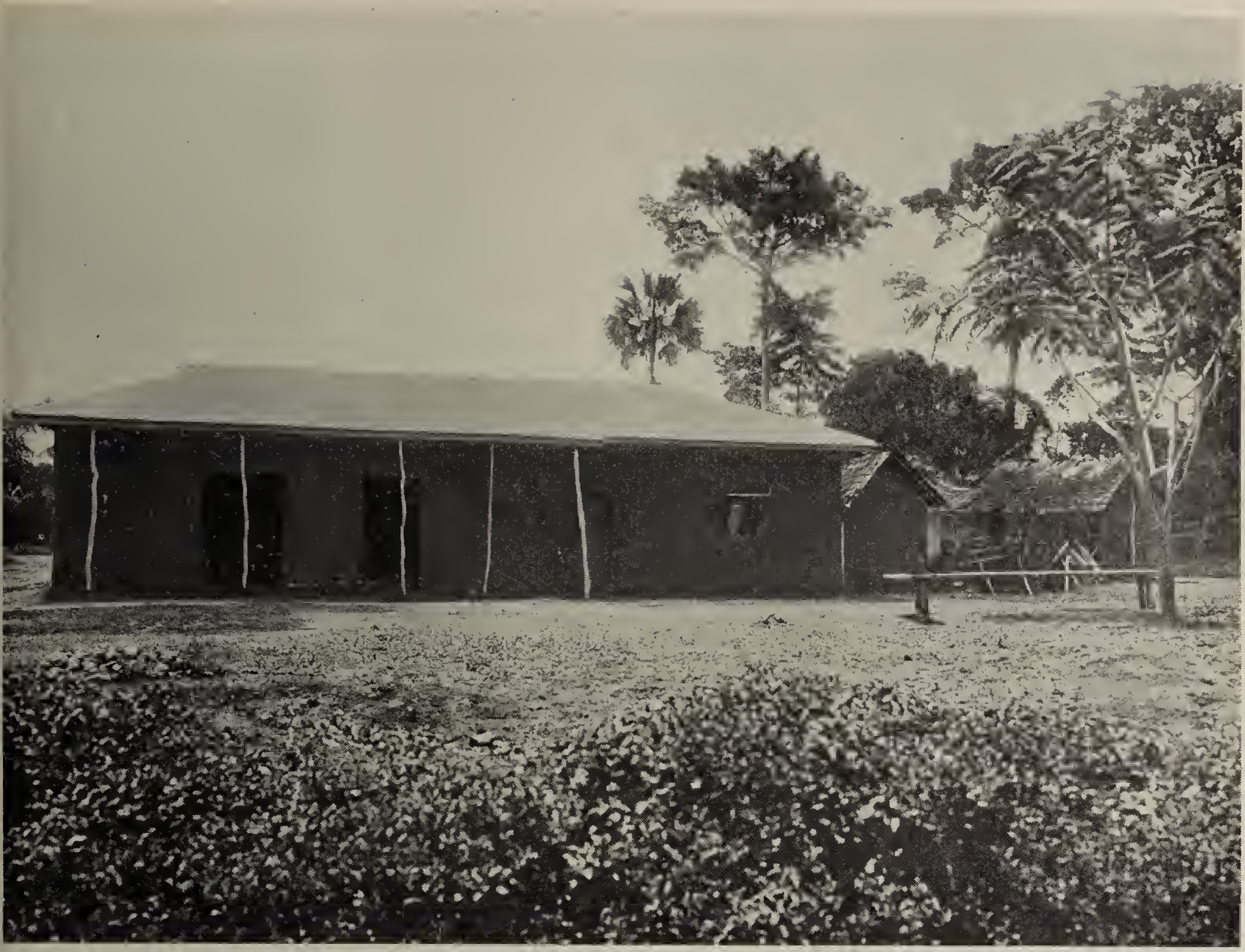
With regard to the recommendations made in the report for 1927-28, the following comments are submitted :—

1. The water supply for Koforidua has not yet materialised. The need is an urgent one.
2. The water-carriage system of nightsoil disposal at Accra and Sekondi, has not yet replaced the motor conservancy system and removal by head-load. A start has been made, however at Accra towards the provision of screened septic tanks and a pumping station.

   Here the malodorous effluent from the open concrete drains will be collected and pumped through a rising main into the sea.

It is now recommended :—

1. That efforts be made to secure a satisfactory water supply for Koforidua and Tamale at the earliest possible moment.



Ntonso, Ashanti. Layout under construction.

Note replacement of old congested, swish and wattle compound by well-ventilated, solid swish type.

Ntonso Layout under construction.

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2. That a special staff of, say, four engineers experienced in the construction of small water supply schemes for townships with a population of from 500 to 5,000 souls, be appointed with a view to adequate supplies of pure water being secured for those towns along the Coast and the Northern Territories and, to a lesser extent (as the need is already being partially catered for by the officers of this department in co-operation with the Public Works Department), in Ashanti where water famine conditions sometimes prevail giving rise to a vast amount of preventible suffering and disease.
3. That motor conservancy systems be introduced at Dunkwa Tarkwa, and Winneba to replace the present slow and unsatisfactory system of carriage by head-load ; the service to be expanded at Accra to allow of duplicate latrine pans and steam disinfection of those not in use, and a similar expansion to take place at Sekondi to permit of all nightsoil being thrown into the sea.
4. That a Maternity Block be provided at the Kumasi Maternity and Child Welfare Centre to serve as a centre for the training of midwives for the Colony of Ashanti and as lying-in accommodation for women living under conditions likely to give rise to infected confinements.
5. That approval be forthcoming for the scheme to convert the Sisters Quarters at Sekondi into a small maternity centre where selected confinements could be carried out.

H. O'HARA MAY,
Deputy Director of Sanitary Service.

IV. PORT HEALTH WORK AND ADMINISTRATION.

With the personnel of the Sanitation Branch up to full strength, it should be possible to appoint whole time port health officers at Takoradi and Accra. It is unlikely that the port health duties at other ports on the Gold Coast will ever attain sufficient proportions to necessitate separate port health officers in addition to medical officers of health of the towns themselves. Immigrants and all arrivals from infected ports were subjected to medical examination on disembarkation on the Gold Coast during the year.

The following extracts are from the Annual Report of the Medical Officer of Health, Takoradi :—

> " The Port and Harbour of Takoradi opened for commerce on the 3rd of December, 1928. From that date to the 31st of March, 1929, 230 vessels were boarded by the Port Medical Officer. No vessel was " infected " or " suspected " within the meaning of Regulation No. 17 of 1928 made under section 3 of the Quarantine Ordinance.
>
> " No case of infectious disease was landed in the Port. 22 cases of sickness were examined by the Port Medical Officer and referred for treatment by a Medical Officer.
>
> " 820 deck passengers were landed. These passengers were medically inspected at the Disinfecting Station. 280 showed signs of recent vaccination and 540 were submitted to vaccination.

" Under Regulation No. 12 of 1924, all vessels on arrival at any place in the Colony and until pratique has been granted shall fly the " Q " Flag, International Code. Under these Regulations power is given to a Visiting Officer to grant pratique in certain circumstances. In the Port all vessels are boarded by the Health Officer. Should he precede the Visiting Officer he grants pratique if satisfied as to the health of the ship. In cases where the Visiting Officer decides not to grant pratique he awaits the arrival of the Health Officer who can then grant or withhold pratique in accordance with the Regulations of the Quarantine Ordinance. Vessels are boarded by the Health Officer at the buoys or the wharf. There is no official Boarding Station apart from the Pilot's Boarding Station. These arrangements have been found to be satisfactory in practice.

" Regulation No. 24 of 1928 contained in Section 117–120 special provisions in regard to the prevention of migration of rodents. Vessels, as a rule, are provided with their own rat guards and no occasion has arisen in which it has been necessary to hire those provided by this Department.

" Most vessels arriving in the Port are cognisant of these Regulations as they are enforced in Ports generally.

" Since 3rd December, 1,124 rats have been caught in the Harbour area. They have been all of the *Rattus Rattus* type or varieties of this species. Arrangements have been made with the Pathologist stationed at Sekondi for occasional bacteriological examination of specimens to be made.

" No dead rats have been found in the Harbour area. The motor launch provided has proved satisfactory. The average monthly cost for maintenance and repairs was £4 12/–.

" It is manned by a crew of three ; a driver, coxswain and deck hand. They are paid respectively 4/– ; 2/8d. ; and 2/– per day.

" The Harbour Authority have put a Water Boat into commission for supplying water to vessels at the buoys. It has a capacity of 180 tons of water. Periodic inspection of the tanks have been made to ensure that it is kept in a satisfactory state. Since 3rd December, 1928, 2,205 tons of water have been supplied to 23 ships anchored either at the wharf or the buoys."

V. MATERNITY AND CHILD WELFARE.

The new hospital was opened in May, 1928, at Korli Bu, Accra.

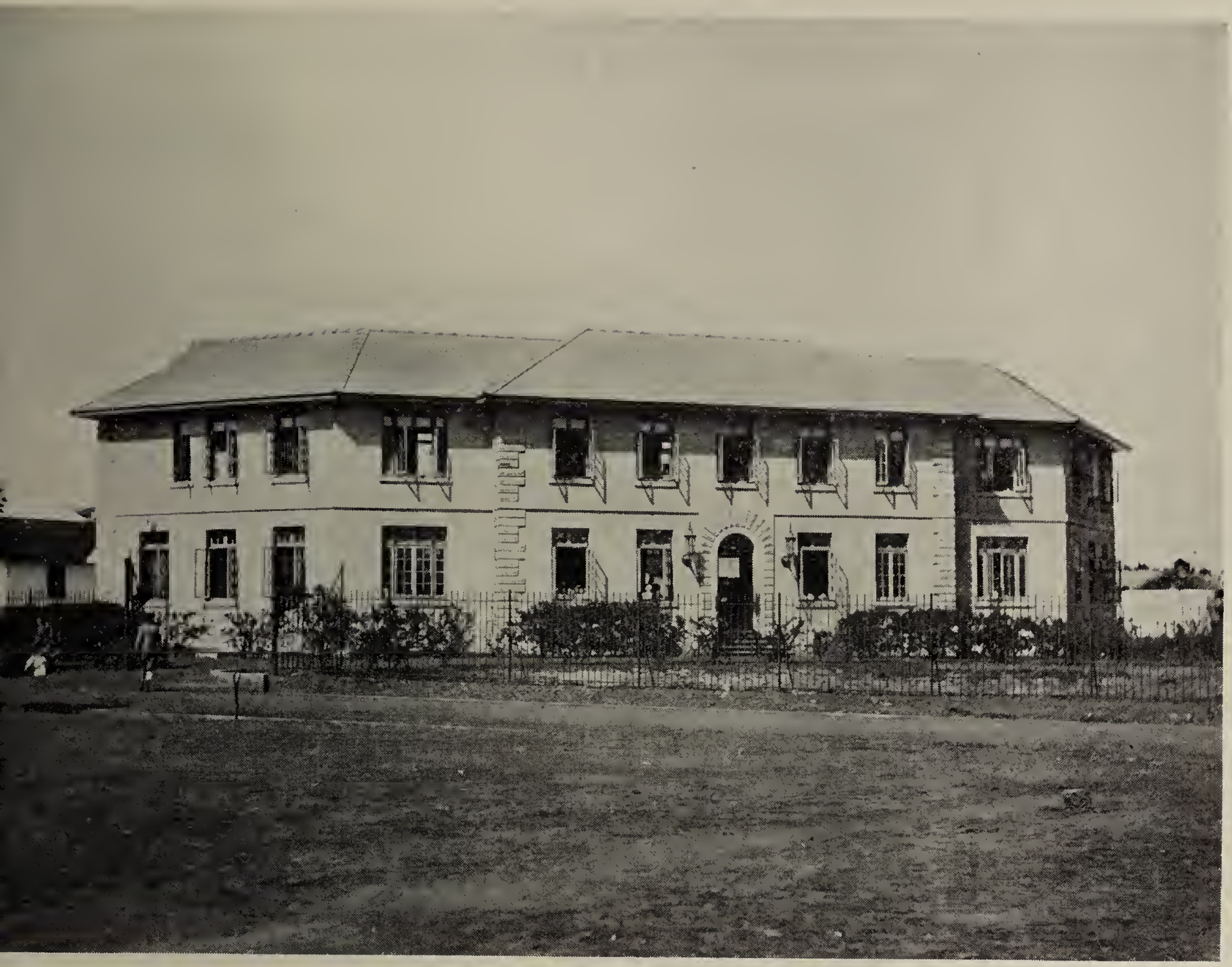
This hospital provides accommodation for fifteen beds and fourteen cots.

The generally shared opinion that this hospital would not be a success owing to the local prejudice against institutional treatment at child-birth was soon proved to be without foundation.

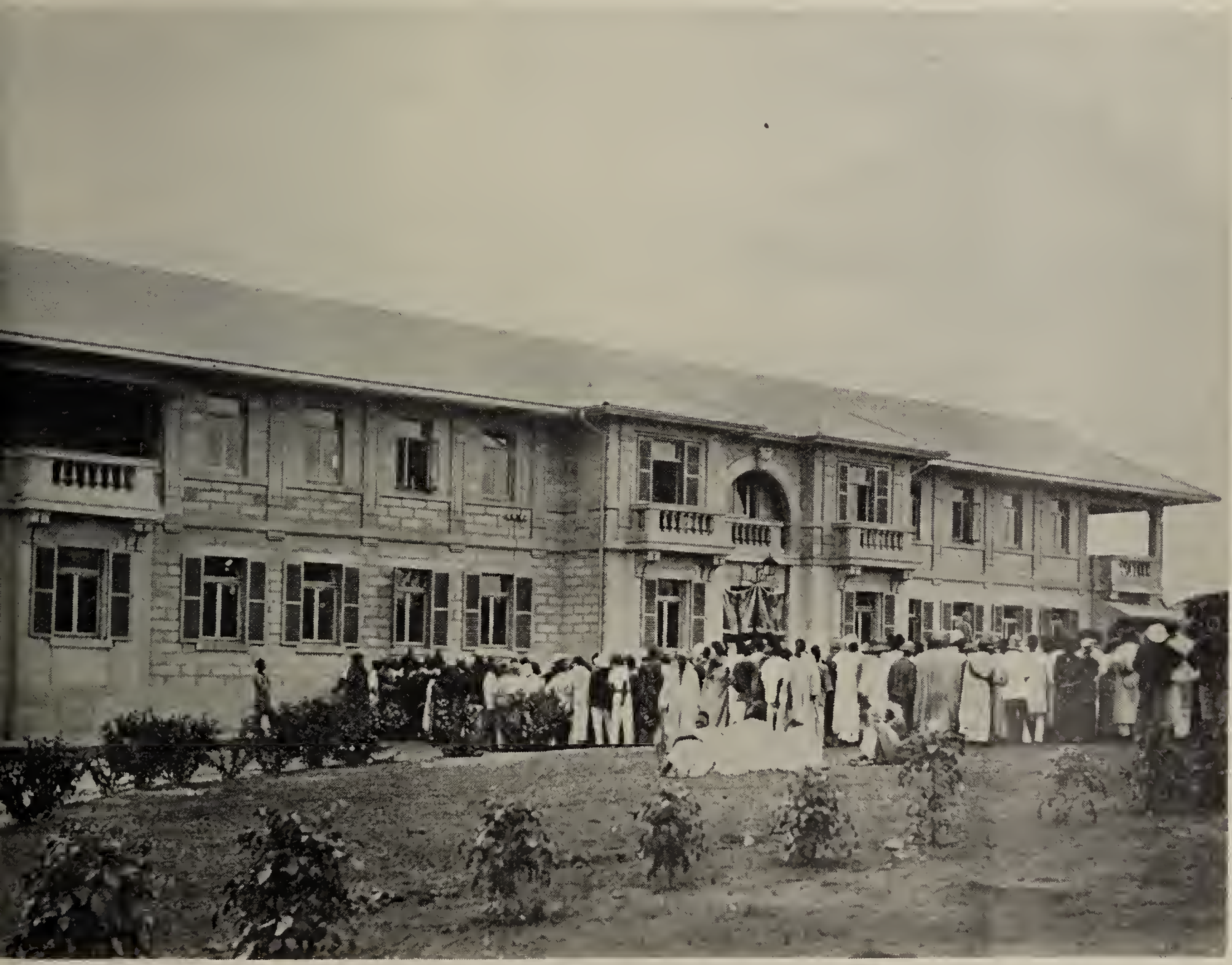
During the ten months from June, 1928, to March 31st, 1929, as many as 104 deliveries took place in the hospital which, in less than a year, now proves to be too small for the needs of the local population. Of the mothers delivered eighty-two gave birth to live infants.

Eighteen or 17.3 per centum of the mothers suffered from puerperal pyrexia due to obstetrical causes—the standard adopted being that laid down by the British Medical Association.

This is a high ratio but it must not be forgotten that the group includes a number of cases of obstructed labour which had suffered from unskilled interference before being admitted.



Accra. Welfare Centre. Princess Marie Louise Hospital and Clinic.



Accra. Maternity Hospital.

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TABLE XIV.

MATERNITY HOSPITAL, ACCRA, MAY, 1928 TO MARCH, 1929.

Number of deliveries.	Number of live births.	Attendances of expectant mothers.	Total Number of in-patients.	Total Number of out-patients.
104	82	2,811	183	3,599

The new hospital and clinic at Kumasi was opened on the 27th of September, 1928, by Lady S. Wilson, the wife of Sir Samuel Wilson, Permanent Under-Secretary of State for the Colonies.

A centre was opened in temporary quarters at Cape Coast in December, 1928, pending the acquisition of land and building of a permanent Welfare Centre.

Two Government nurse-midwives were employed in Accra and Christiansborg during the year and they conducted thirty-eight confinements.

Several nurse-midwives-in-training received part of their training at the Maternity Hospital, Accra, and will be qualified as nurse-midwives and employed in the more populous centres during the coming year. It is hoped that the local untrained midwife will be gradually superseded by her trained sister.

The ante-natal clinics continued to function satisfactorily and increased in popularity.

There can be no doubt whatever that the propaganda spread by members of the Gold Coast League for Maternity and Child Welfare in the course of domiciliary visits has gone a long way towards popularising both infant and ante-natal clinics.

The results of ante-natal consultations are incalculable and should go far towards removing the terrible blemish on the Colony of a high puerperal mortality rate.

The following table affords some idea of the work at the Welfare Centres in 1928–29.

TABLE XV.

Clinic.	Attendances of Children.			Attendances of Expectant Mothers.	
	1926–27.	1927–28.	1928–29.	1927–28.	1928–29.
Accra	12,278	15,572	18,938	588	946
Christiansborg	3,962	7,849	13,982	292	1,040
Sekondi	11,605	20,091	9,623	802	1,638
Chama	1,137	2,211	1,426	—	4
Kumasi	—	15,846	24,019	328	1,787
Cape Coast	—	—	3,838	—	21
Total	28,982	61,749	71,826	2,010	5,436

The Medical Officer of Health, Ho, and Trans-Volta Districts, referring to the Welfare Centre in the Mandated Territory of Togoland commented as follows :—

> " The Roman Catholic Sisters at Kpandu hold an Infant Clinic. This is exceedingly popular. During the year, 2,913 new cases

were treated. Included in this are many visits made to patient's homes on foot and on bicycle."

VI.—HOSPITALS, DISPENSARIES AND VENEREAL CLINIC.

The following Table shews the numbers of in-patients treated at Accra, Sekondi and Kumasi Hospitals respectively :—

Station.	1926–27.		1927–28.		1928–29.	
	European.	African.	European.	African.	European.	African.
Accra	294	2,640	286	2,724	312	2,606
Sekondi ..	172	885	224	794	224	868
Kumasi ..	140	1,953	151	2,412	203	2,508
Totals ..	606	5,478	661	5,930	739	5,982

Average Cost per Patient per Diem.

The average daily cost per patient for the principal hospitals of the Colony is shown below.

(These costs have been based on the expenditure for diets and provisions, fuel and light, medical comforts and kitchen staff only.)

	1927–28.	1928–29.
European Hospitals. (Accra, Kumasi, Tamale, Sekondi, Cape Coast, Axim) average cost ..	*s.* *d.* 6 4¾	*s.* *d.* 5 4½
African Hospitals. (Gold Coast Hospital, Accra, Kumasi, Tamale, Sekondi, Cape Coast, Axim, Saltpond) average cost	0 10	0 11½

European Hospitals.

Accra.—Extensive alterations which have resulted in a great general improvement to the European Hospital were carried out during the year. Before the changes were effected, the building contained a number of large sized wards with several beds in each and internal arrangements both for patients and for staff were not convenient. Arrangements for seeing out-patients especially were unsuitable. The larger wards have now been divided up to make smaller ones which are very much more comfortable for patients and convenient for the staff ; a new organisation of the Senior Medical Officer's Office, Clinical Room, Consulting Room, and Patients' Waiting Room has been effected. A new Irrigating Room has been added. The arrangements for dealing with out-patients have been much improved.

The whole building has been repainted and is in excellent repair.

African Hospitals.

Accra.—The Gold Coast Hospital continues as before its valuable work amongst the African population of the Gold Coast.

The following table will give an idea of the amount of work accomplished :—

STATISTICS.

	1926–27.	1927–28.	1928–29.
Out-patients—Total	11,283	11,040	13,786
In-patients—Total	2,640	2,724	2,661
Surgical operations, Major	740	644	602
Surgical operations, Minor	192	364	695
Average daily number in hospital	200	207	208

The training of Dispensers and Nurses for the outstations of the Colony is mainly carried on in this Hospital. During the year a scheme for increasing the number of Nurses-in-training at the Gold Coast Hospital and Kumasi and Sekondi African Hospitals was worked out and is to be put in force in the following year. The object is to keep constantly in training a supernumerary reserve at the larger centres so that when calls for staff come from out-stations it will be possible to furnish at once properly trained personnel and avoid the dislocation of work and impairment of efficiency at the larger centres which otherwise occurs.

MATERNITY HOSPITAL, ACCRA.

This new Hospital was opened on the 19th May, 1928 and has already proved a great success. It was thought at first that African women would be slow to avail themselves of its advantages, but the fact is that the accommodation has proved too small for the numbers seeking admission. It was pointed out in last year's report that the Hospital would serve as a training ground for midwives, and this is already being carried out.

Miss G. M. L. Summerhayes, Woman Medical Officer, has been in charge since the opening of the Hospital and owing to her professional ability combined with a peculiar gift of winning the confidence of African women, her work has been of the highest value. Her report is attached as Appendix H.

TAKORADI AND SEKONDI.

A European and an African Hospital exist at Takoradi which had been used by the Harbour Works Contractors for their staff and were taken over by Government on the 1st May, 1928.

When taken over a good deal of renovation was required. They were not fully equipped and ready to open at the end of the year. A scheme has been drawn up for the conversion of the present European Hospital, Sekondi, into an African Hospital and the conversion of the Nursing Sisters' quarters into an Infant Clinic and Maternity Hospital and will be carried into effect during the following year. Various other alterations are in view to suit the altered situation which has been brought about by the opening of the Harbour at Takoradi.

ODA.

A fully equipped up-to-date Hospital consisting of one male ward of 12 beds, one female ward of four beds, an operating theatre, a dispensary block with dispensary, store, consulting room, clinical room and waiting room, dressing shed, quarters for dispenser, nurses, etc., mortuary, laundry house, outhouses, etc., was opened on the 20th May, 1928 and has already fully justified its erection.

AXIM.

At Axim, where it was urgently needed, a new hospital of 16 beds (12 males and four females) was commenced during the year. There will be an operating theatre with anaesthetic and sterilizing rooms, nurses room, pantry, bathrooms, etc., also a dispensary block with waiting room, medical officer's office, clinical room, store and dispensary, etc. Complete new equipment is being provided and it is hoped that it will be opened in July or August of 1929.

WIOSO.

A new dispensary and operating theatre with a four bedded ward was completed in the middle of July, 1928 but it was not possible to post a medical officer there till December, 1928.

TRAVELLING DISPENSARY NO. 1.

In last year's report a reference was made to the encouraging results already obtained by the first travelling dispensary. This first took the field on the 26th February, 1927 and has continued at work in the North Western Section of the Northern Territories throughout the year. The Medical Officer in charge, Dr. G. F. T. Saunders, has done most useful work. The following figures give a rough idea of the large amount of the work accomplished :—

Out-patients. Total cases seen	11,198
Yaws (males and females about equally divided) ..	7,190
Leprosy (seen)	396
Eye affections	851
Respiratory conditions	1,175
Operations (one major)	34

The large number of cases attended is very gratifying and many would undoubtedly never have been reached by the less mobile establishment. Yaws cases predominated and it is unfortunate that only 30% of cases returned for repeated injections. Still this would mean that over 2,000 of the 7,190 treated did persist in treatment. Two lepers, who had previously been treated by Dr. Dixey, returned regularly and showed great improvement. Most of the lepers treated returned irregularly or not at all.

As a commencement of effort on these lines, however, the first travelling dispensary must be considered a decided success. As Dr. Saunders writes :—" The fear of anaesthetics has been largely abolished in Tumu District. The effect of the removal of a large elephantiasis, the immediate and dramatic restoration of sight by an entropion operation on a patient whose eyes had been closed in painful spasm, the removal of tumours without fire—all these things must tend to cause confidence and will facilitate future medical work in the area."

It must, on the other hand, be admitted that the neglect to return for further injections vitiates much of the work done on yaws, an objection which, however, is equally valid even in the case of stationary hospitals, but it is believed that it is only a matter of time till patients learn the value of persisting in whatever course of treatment may be laid down.

SECOND TRAVELLING DISPENSARY.

A second travelling dispensary unit was got ready and equipped in January and February, 1929 and placed in the hands of Dr. Dixey, Secretary to the British Empire Leprosy Relief Association, early in

March. The reason for assigning this unit to Dr. Dixey was to enable him to make his investigations into leprosy without raising the suspicion amongst the natives that he was especially interested in this disease and in this way to gain their confidence. Had he toured without being prepared to treat all diseases and had he made an open investigation into the prevalence, etc., of leprosy alone, he would have learnt little or nothing in the areas visited.

In three weeks, 2,097 new patients were seen and treated and the return visits amounted to between 1,400 and 1,500; of these 63 were lepers. The work will continue during the following year.

THIRD TRAVELLING DISPENSARY.

Sanction for the purchase and upkeep of a third travelling dispensary has been given for the year 1930–31. When completed it is proposed to send it travelling in the northern section of the Mandated area of Togoland, in order that already existing services may be extended there.

MISSION DISPENSARIES.

Mention might here be made of useful dispensary work carried out by the White Fathers at Bolgatanga and by the Sisters at Navrongo in the Northern Territories.

Three White Fathers are stationed at Bolgatanga, seven at Navrongo and three at Wiaga; and four Sisters are at Navrongo.

At Kpando in the Ho District of Togoland most useful work is being done amongst the people by Sisters of the Roman Catholic Mission under the supervision and encouragement of the Medical Officer at Ho. This work has been so successful that the Mission proposes to open up at Dzodze in the Keta District, a thickly populated area, and Government has promised to assist the work there under the supervision of the Medical Officer, Keta.

Simple drugs, dressings, etc., are issued to the Kpando Mission and an annual grant allowed, and it is proposed to do the same at Dzodze when it is opened.

KUMASI.

Various improvements were effected at the European Hospital (new laundry, covered ways from kitchen to hospital, etc., etc.)

Water tanks were added to the African Hospital to enable work to be carried on pending the installation of a pipe-borne water supply for Kumasi.

Attention is here drawn to the large amount of work which is being accomplished year by year in the African Hospital, although it is now out of date and accommodation is insufficient. The result is that work is done under difficulties, and the standard achieved cannot be so high as at the Gold Coast Hospital, Accra. Nevertheless very good work is being done as the following table will show.

KUMASI AFRICAN HOSPITAL.

	1927–28.	1928–29.
Out-patients—Total	18,358	18,546
In-patients—Total	2,412	2,508
Surgical Operations, Major	182	202
Surgical Operations, Minor	265	248
Average daily number in hospital	100	124.6

This table will at the same time show the urgent need for a more modern and larger hospital. The question is under consideration, but the selection of a suitable site is causing some difficulty.

The new infant welfare clinic was formally opened by Lady Wilson on the 27th September, 1928, and has been doing extremely useful work. Work had been formerly carried on under difficulties at the disinfecting station. Over 13,000 out-patients were seen during the year.

KINTAMPO.

A new block consisting of a ward for 12 patients and two private wards of 1 bed each with the usual annexes was opened in April, 1928. A new operating theatre was built, also a new store for the Gold Coast Regiment Mobilisation equipment, and numerous repairs to existing buildings carried out. All the old wooden beds have been replaced by standard pattern iron bedsteads.

SUNYANI.

A new hospital in a very favourable situation was nearing completion towards the end of the year. It contains 16 beds (12 male and 4 female). There is abundant space for future expansion which will probably be required in the not distant future.

BEKWAI.

A new female ward was built to take 6 beds, also a new operating theatre and quarters for nurses.

YENDI. (NORTHERN TOGOLAND).

Towards the end of the year a new ward capable of accommodating 12 patients was erected at Yendi and it is proposed to erect a suitable operating theatre in the following year.

TABLES AND RETURNS, ETC.,

At Appendix A will be found a list showing all the Hospitals and Dispensaries in the Colony and Mandated Territory of Togo, including the Infant Welfare Centres and Contagious Diseases Hospitals administered by the Sanitation Branch.

Tables V and VI give the combined summaries of in– and out-patients treated by both the Medical and Sanitation Branches during the year in the hospitals and dispensaries of both branches (but not including the cases treated in the contagious diseases hospitals).

The venereal clinic figures are included in the Out-patients Table.

REPORT ON THE WORK OF THE X-RAY AND ELECTRO-THERAPEUTIC DEPARTMENT, GOLD COAST HOSPITAL, ACCRA, DURING THE YEAR 1ST APRIL, 1928 TO 31ST MARCH, 1929.

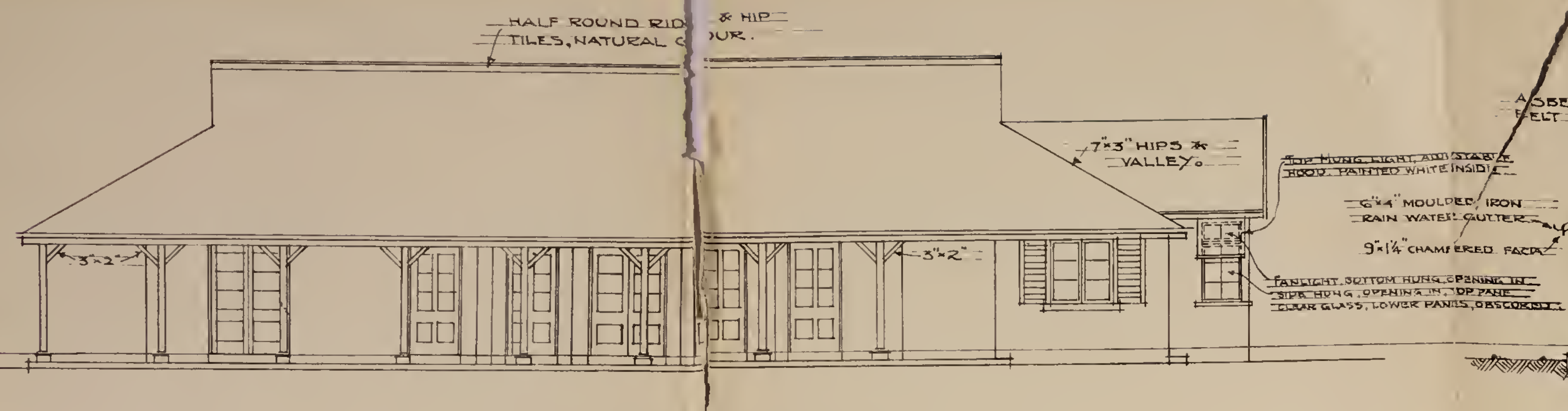
During the year under report this Department of the Gold Coast Hospital was in charge of Mr. G. MacLardie, Radiographer. He took over the duties of the post on the 15th February, 1928.

G.C.NO. A.125/

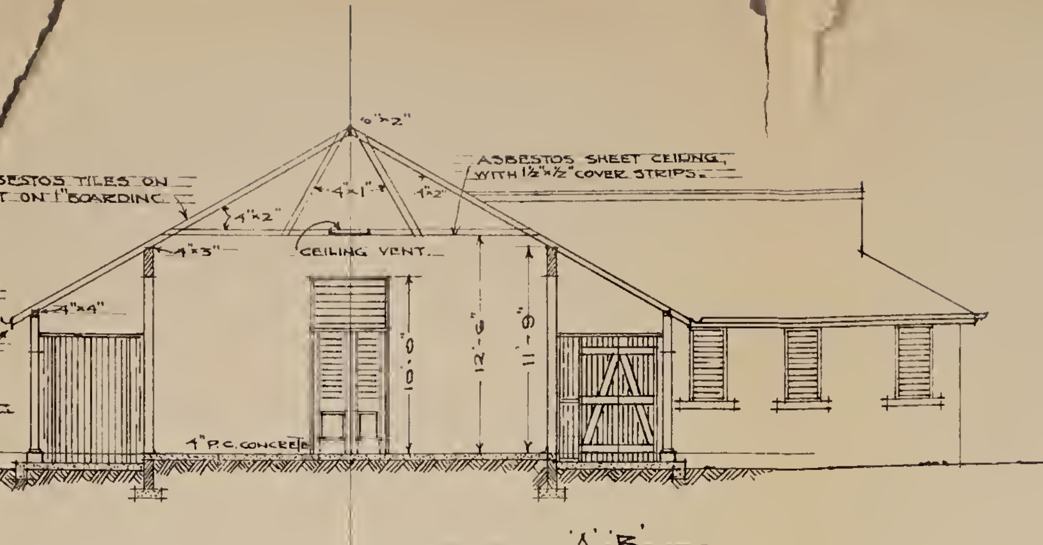
NATIVE HOSPITAL. TYPE I. 1927.

AMENDING G.C.No 29286.

FOR DISPENSARY, DISPENSERS QRS., MORTUARY ETC. SEE G.C.A. 126/


HALF ROUND RID & HIP
TILES, NATURAL C OUR.
7"×3" HIPS & VALLEY.
3"×2"
3"×2"
TOP HUNG LIGHT, ADJUSTABLE HOOD, PAINTED WHITE INSIDE
6"×4" MOULDED IRON RAIN WATER GUTTER
9"×1¼" CHAMFERED FACIA
FANLIGHT, BOTTOM HUNG, OPENING IN. SIDE HUNG, OPENING IN, TOP PANE CLEAR GLASS, LOWER PANES, OBSCURED.

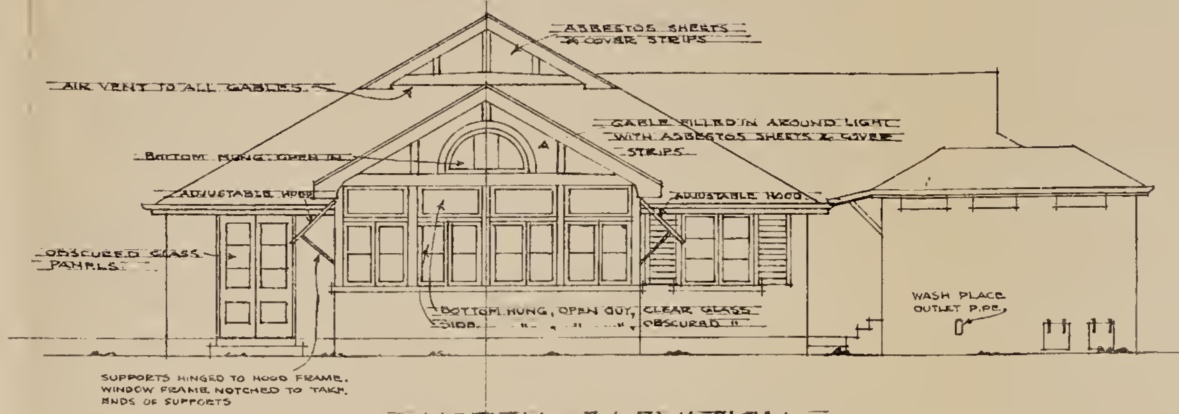
FRONT ELEVATION


ASBESTOS TILES ON FELT ON 1" BOARDING
6"×2"
4"×1"
4"×2"
4"×2"
4"×3"
4"×4"
ASBESTOS SHEET CEILING, WITH 1½"×½" COVER STRIPS.
CEILING VENT.
10'-0"
12'-6"
11'-9"
4" P.C. CONCRETE

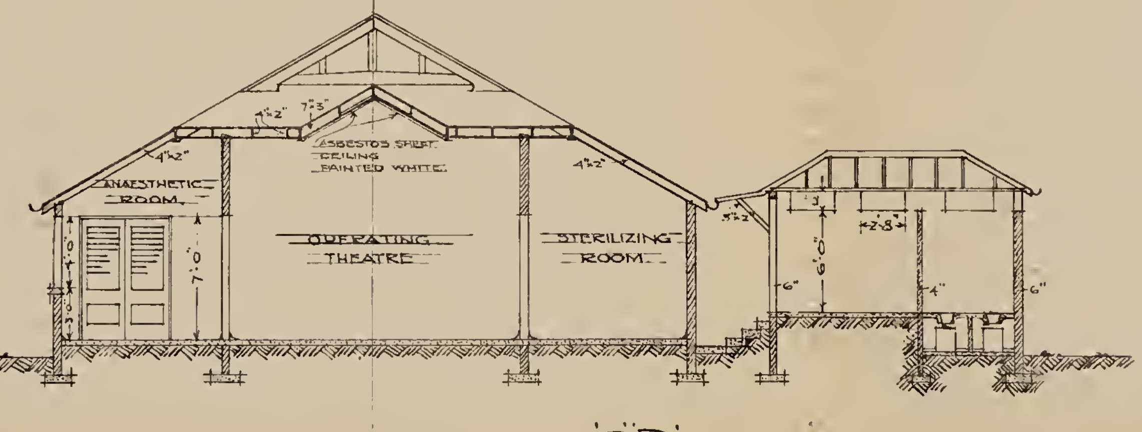
SECTION A.B.

NOTE: THROUGHOUT HOSPITAL, ALL SKIRTINGS TO BE COVED IN CEMENT.

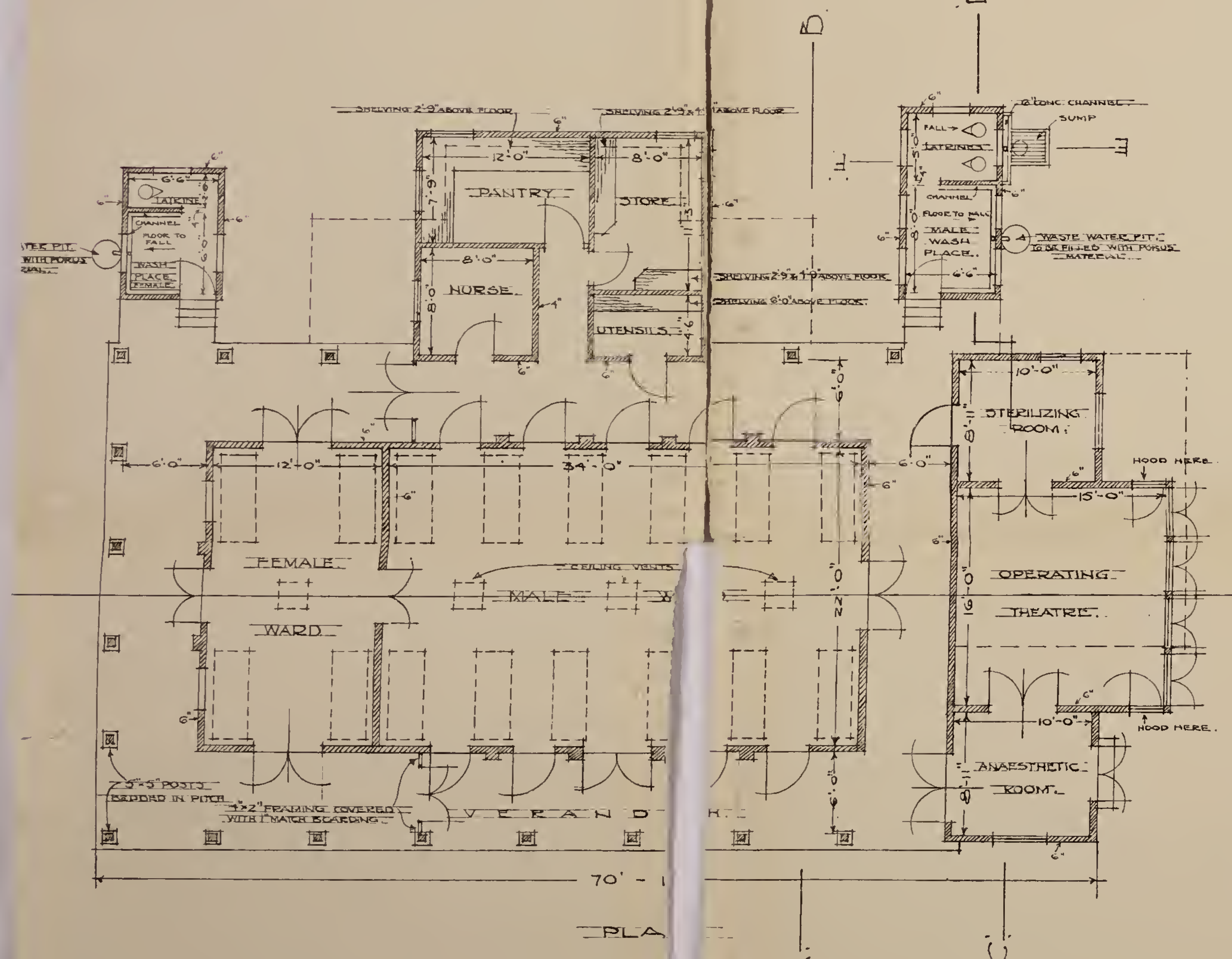
NOTE:- THE POSITIONS OF THE THEATRE & PANTRY ANNEXES CAN BE REVERSED AS SHOWN IN DOTTED LINES ON PLAN WHERE THE PREVAILING BREEZE AND LIGHTING CONDITIONS RENDER IT NECESSARY. IN ALL CASES THEATRE ANNEX TO FACE DUE NORTH.


ASBESTOS SHEETS & COVER STRIPS
AIR VENT TO ALL GABLES.
GABLE FILLED IN AROUND LIGHT WITH ASBESTOS SHEETS & COVER STRIPS
BOTTOM HUNG, OPEN IN
ADJUSTABLE HOOD
ADJUSTABLE HOOD
OBSCURED GLASS PANELS
BOTTOM HUNG, OPEN OUT, CLEAR GLASS
SIDE " " " " OBSCURED "
WASH PLACE OUTLET PIPE
SUPPORTS HINGED TO HOOD FRAME. WINDOW FRAME NOTCHED TO TAKE ENDS OF SUPPORTS

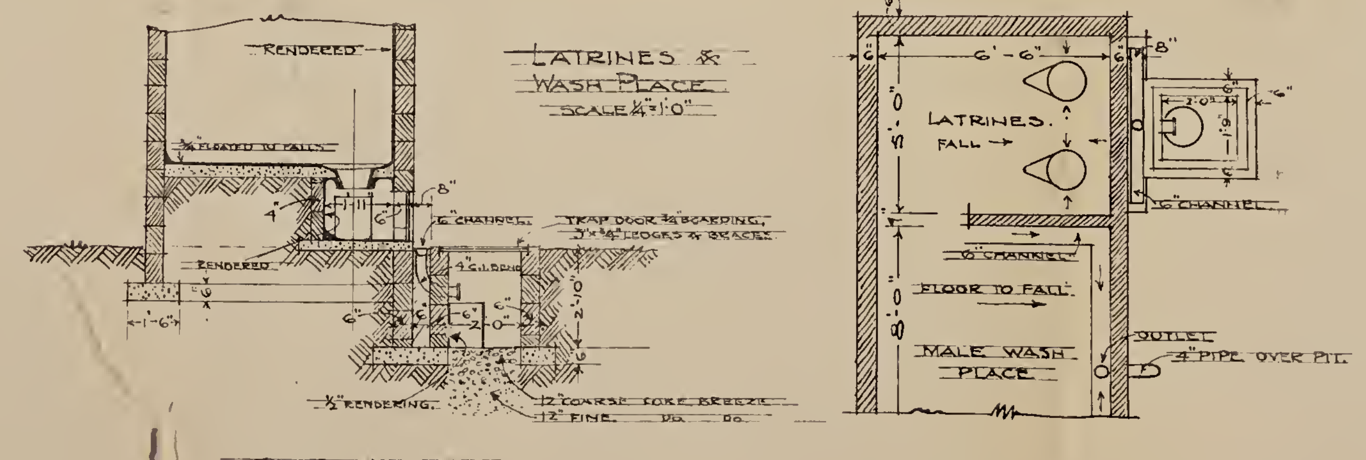
NORTH ELEVATION



SECTION C.D.



PLA

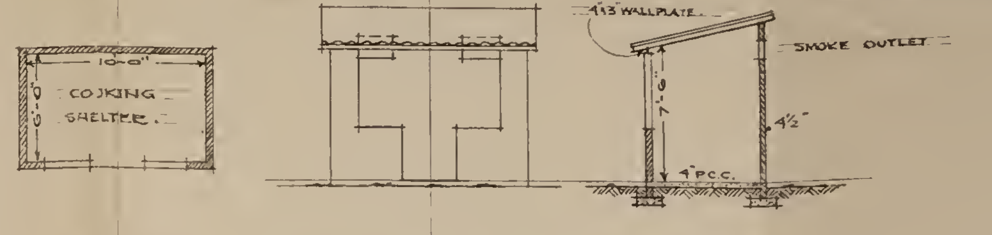


LATRINES & WASH PLACE

SCALE ¼"=1'0"

PART SECTION

PART PLAN.



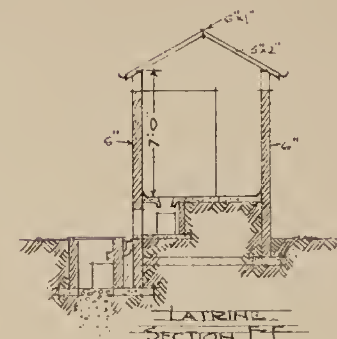
PLAN

ELEVATION

SECTION

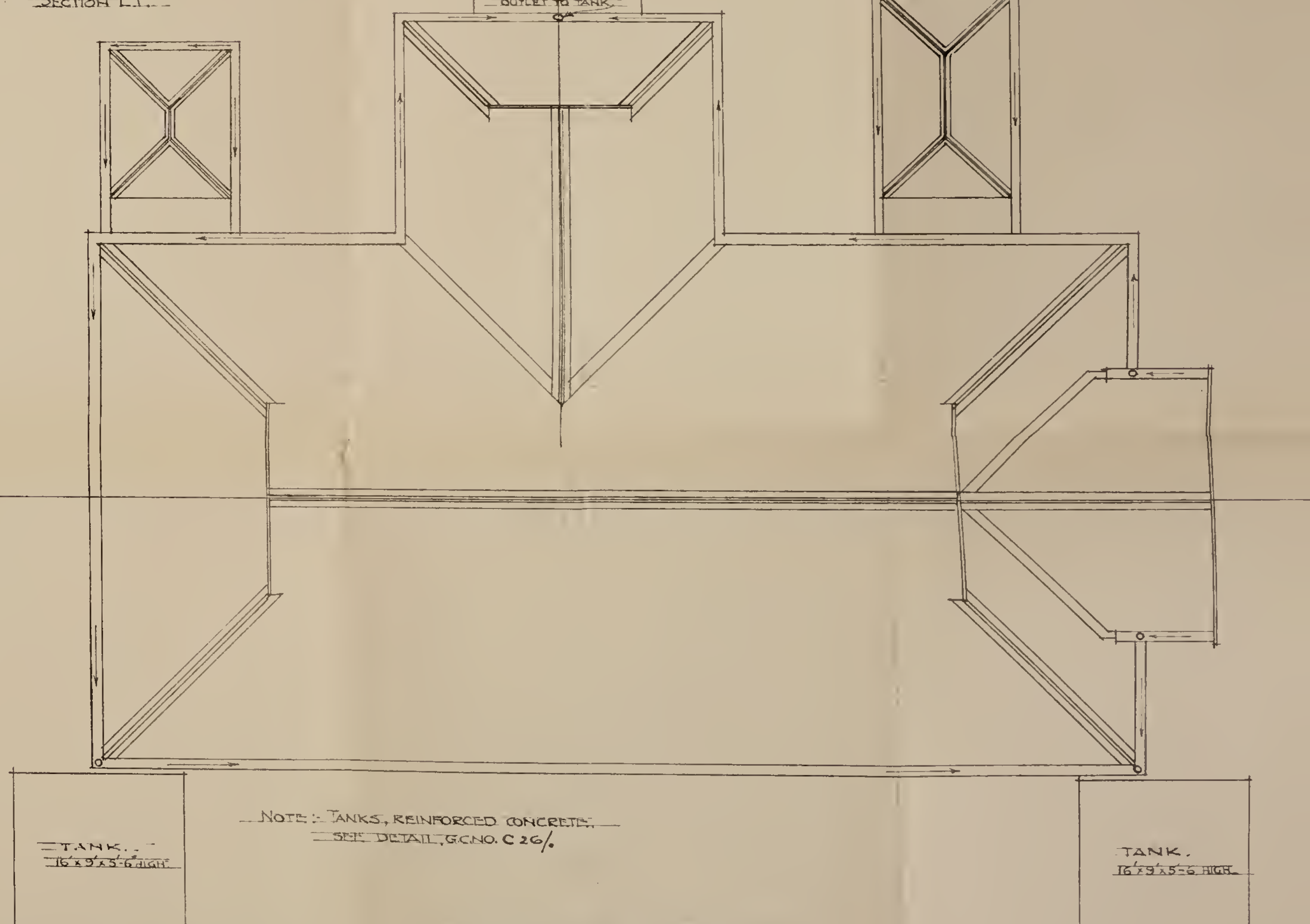
COOKING SHELTER

TO BE PROVIDED IN A CONVENIENT POSITION.



LATRINE

SECTION E.F.



NOTE:- TANKS, REINFORCED CONCRETE. SEE DETAIL, G.C.NO. C 26/.

ROOF PLAN.

R.W. Reid. L.R.I.B.A.
FOR CHIEF ARCHITECT
4.10.27.

Selwyn Clarke
for p. DR. OF SANITARY SERVICES
6.10.27.

S Harper.
CHAIRMAN C.B.OF H.
6.10.27

DR. OF PUBLIC WORKS.
6.10.27

The electric supply has been fully adequate for the work demanded. The X-Ray plant complies with the National Physical Laboratory standards for the protection of operator and patients.

A noteworthy feature is the steady increase in the number of patients attending the electro-therapeutic section. In the year 1926–27 the total number of treatments given was 2,034. In 1927-28 it had risen to 3,177. Whilst in the year under review it reached the figure 5,702. The Radiographer's Report is as follows :—

" The total number of X-Ray cases was 1,367, an increase of 196 over the previous 12 months, classified as under :—

" Examinations	of Bones	692
,,	,, Skulls	48
,,	,, Sinuses	53
,,	,, Chest (Lungs, etc.)	144
,,	,, Hearts	8
,,	by Barium Meal	56
,,	,, ,, Enema	4
,,	of Urinary Tract	46
,,	,, Gall Bladder and Liver	18
,,	,, Pregnancy	11
,,	,, Dental Cases	110
,,	by Screen	28
,,	of Spines	95
,,	by Cholecystography	2
,,	for Foreign bodies	24
,,	under Lipiodol injection	28
		1,367

Seventy treatments of X-Ray Therapy were given during the year ; an increase of fifty-four over the previous 12 months.

A further 5,632 cases have been treated in the Electro-Therapeutic Department during the 12 months consisting of massage, electrical stimulation, muscle-testing, diathermy, radiant heat, etc.

In November, 1928, a Mercury Vapour Lamp (Ultra Violet Ray) was installed and first operated on the 28th November, 1928. 364 cases have received treatment ; this number is included under the Electro-Therapeutic return."

(Sgd). G. MACLARDIE,
Radiographer.

VENEREAL CLINIC, ACCRA.

1st APRIL, 1928 to 31st MARCH, 1929.

Review of the Work Done.

As a result of providing free treatment under conditions of secrecy there are distinct indications that the knowledge of the harmful and far-reaching effects of Venereal Diseases are being better realized and the public is really awakening to the benefits to be derived from early expert treatment, although it not infrequently occurs that a course of treatment is commenced and discontinued before cure is effected. Further, there is an increasing tendency for persons who suspect they have contracted venereal diseases to take advantage of the facilities provided for accurate diagnosis. This is all to the good as it leads to the detection of disease in its earliest stage when treatment is so much more easy and effective.

ATTENDANCES.

As compared with last year there was a rise in the number of cases of gonorrhoea seen which have increased from 414 to 501 in male and 148 to 300 in females.

New cases of syphilis increased from 337 in 1927–28 to 485 in 1928–29 (an increase of 44%). New cases of gonorrhoea increased from 662 in 1927–28 to 801 in 1928–29 (an increase of 21%). The ratio between the new cases of gonorrhoea to new cases of syphilis declined from 1.96 : 1 in 1927–28 to 1.65 : 1 in 1928–29.

The number of " new cases," non-venereal, found not to be suffering from Venereal disease amounted to 315 as compared with 882 in 1928. This large decrease of over 62% was due to the fact that no fresh yaws cases were treated at the clinic during the year, these being directed to a special yaws clinic at the Gold Coast Hospital.

The number of patients discharged after completion of course was 376 as against 98 in 1928. The chief difference from the figures recorded in previous years is the decrease in the total number of patients suffering from conditions found to be non-venereal.

The usual weekly Wasserman test was carried on during the year by the Research Institute. 320 bloods were examined of which 168 were found positive. Dried specimens examined numbered 220 of which 49 contained gonoccoci.

ATTENDANCES.

	1927.	1928.	1929.
Patients treated (old and new cases)	4,496	4,244	3,852
Gonorrhoea Male and Female	1,623	562	1,599
Chancroid	115	22	80
Syphilis Male and Female	367	337	11,361
Framboesia	259	882	—
Non-Venereal	—	—	812
Injections N.A.B.	6,409	2,927	1,819
Injections B.S.T.	6,272	5,924	1,395
,, Mercury	1,066	—	—

Below is shown the detailed return of all cases treated during the year :—

Return showing number of cases treated in the Venereal Clinic for the year 1929 and conditions other than Venereal, etc.

	Primary Syphilis.		Secondary Syphilis.		Tertiary Syphilis.		Congenital Syphilis.		Soft Chancre.		Gonorrhoea.		Conditions other than Venereal.		Total.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
I. Remaining under treatment 1st April, 1928	213	4	88	152	182	237	—	—	—	—	31	767	298	199	812	1,359
II. New Cases	62	1	56	71	122	173	—	—	80	—	501	300	134	181	955	726
(A) Complete I full course	49	1	25	25	59	90	—	—	—	—	—	—	73	111	206	227
(B) Complete II full course	17	—	14	14	32	40	—	—	—	—	—	—	40	58	103	112
(C) The full course	—	—	—	—	—	—	—	—	—	—	312	236	—	—	312	236
(D) The full course with final test ..	—	—	—	—	—	—	—	—	—	—	161	—	—	—	161	—
(E) Ceased to attend before completion of full course	23	—	19	26	31	65	—	—	—	—	130	62	35	74	238	227
III. Discharged after completion of course ..	17	—	14	14	32	40	—	—	—	—	161	—	40	58	264	112
IV. Remaining under treatment 1st April, 1929	134	2	100	122	212	328	—	—	—	—	71	769	284	137	801	1,358

(Sgd.) C. E. REINDORF,
Medical Officer in charge, Venereal Clinic.

REPORT ON THE WORK OF THE DENTAL CENTRES DURING THE YEAR.

Staff :—Mr. Campbell, Dental Surgeon, was stationed at Kumasi for most of the year ; he proceeded on leave on the 30th December, 1928 and returned on 27th March, 1929. Dental work has been carried out at the following Centres :—

Accra—Kumasi—Tamale—Cape Coast.

The following statements will show the number of patients of all classes treated, the number and nature of the treatment given, and the chief pathological conditions that were dealt with during the period.

A.—Patients :—

Officials (European) ..	789
Officials (Africans)	1,235
Total (Officials) ..	2,024
Non-officials (European) ..	805
Non-officials (African) ..	1,605
Total (Non-officials) ..	2,410

B.—The following gives the figures of the previous two years for comparison :—

	1926–27.	1927–28.	1928–29.
Officials—European	698	762	789
„ African	872	819	1,235
Total Officials	1,570	1,581	2,024
Non-officials—European	559	708	805
„ „ African	1,449	1,506	1,605
	2,008	2,214	2,410
Total treated	3,578	3,795	4,434

The increase for 1926–27 over 1925–26 was 32.25 per cent.
The increase for 1927–28 over 1926–27 was 6.07 per cent.
The increase for 1928–29 over 1927–28 was 16.84 per cent.

C.—The following table shows the number of Dental Operations performed.

	Officials.	Non-officials.	Total.
(*a*) Extractions :			
Local anaesthesia	1,237	1,680	2,917
General anaesthesia	112	49	161
(*b*) Fillings :			
Gold	20	18	38
Amalgam	294	298	592
Porcelain	204	185	389
Cement	112	102	214
Temporary	210	236	446
(*c*) Dressings (including root treatment)	531	450	981
(*d*) Scalings	211	202	413
(*e*) Bridges, crowns and other restorations	15	18	33
(*f*) Dentures	110	168	278
(*g*) Repairs to bridges and dentures	85	102	187
(*h*) Minor treatments	86	159	245

D.—The Chief pathological conditions met with during the period were as follows :—

(1) Dental caries	2,975
(2) Dental abscess	831
(3) Pulpitis (acute and chronic)	356
(4) Periodonitis (acute and chronic)	453
(5) Excessive calcific deposit	488
(6) Cases diagnosed as true pyrrhoea alveolaris	523
(7) Gingivitis	433
(8) Septic roots	412
(9) Stomatitis	186
(10) Spesis arising in connection with eruption of permanent dentition	117
(11) Malposition of the teeth	52
(12) Fracture of teeth	24
(13) Necrosis of Alveolus	28
(14) Neuralgia of non-dental origin	12
(15) Polypus of pulp	47
(16) Pulp stones	13
(17) Excessive post-extraction haemorrhage	10
(18) Supernumerary teeth	59
(19) Dental cyst	4
(20) Epulis	8
(21) Fibrous Sarcoma of jaw	3
(22) Antral disease	2
(23) Cancrum oris	2
(24) Odontomes	3
(25) Perforation of the palate (with supply of obturator)	1

The prosthetic work of the department has been satisfactorily performed by Mr. L. Minto, Dental Mechanic.

W. H. DONALD,
Government Dental Surgeon.

VII.—PRISONS AND ASYLUMS.

Prisons.

The prisons of the Gold Coast administered by the Prison Department are as follows :—

A. Convict Prisons	4
B. Local Prisons	24

The *Convict Prisons* are situated at Accra (Ussher Fort) Sekondi (Central) Kumasi and Tamale.

The local Prisons are as follows and are constructed as shown below :—

Converted Forts of solid masonry : Accra James Fort ; Elmina ; Cape Coast ; Sekondi (Fort Orange) ; Axim ; Keta.

Brick : Tarkwa ; Kintampo.

Stone : Akuse ; Ho ; Salaga.

" Swish " or Pisé : Bole ; Obuasi ; Winneba ; Sunyani ; Kpando ; Gambaga ; Zuarungu ; Bawku ; Navrongo ; Lawra ; Wa ; Yendi ; Krachi.

The General Health was good throughout the year. The general appearance of the prisoners was satisfactory.

There is separate accommodation for Females at Accra, Elmina, Kumasi, and Keta.

The daily average of female prisoners for the year was 31.82 as compared with 31.39 for the previous year.

In all prisons, prisoners sleep in association cells. In the more modern prisons the cells are mostly smaller, accommodating three prisoners. This refers more particularly to the four convict prisons, whilst cells at all local prisons are for the most part large cells accommodating from 10 to 30 prisoners.

There are no single cells except for punishment segregation.

At Accra, Sekondi, Kumasi, and Tamale long sentence prisoners are employed chiefly in the Workshops e.g. shoe-making, rope-making cane-work, carpentry, etc., or on reconstruction work. Short sentence prisoners are employed on farming or sanitary work. The hours of labour are from 6.0 a.m. to 11 a.m. and from 12.30 p.m. to 3.30 p.m.

Except in the case of particularly dangerous prisoners, of whom there are very few, no prisoners are required to work in their cells.

Satisfactory Sanitary arrangements exist in all prisons.

Rations were adequate and of good quality and no illness due to food occurred. For the diet scale *see* appendix to this report.

No complaints of importance were made to the Director or visitors during the year.

No major alterations were made to any of the buildings. A small hospital ward and dispensary have been fitted out and equipped at Tamale.

The average number on the sick list was 53 i.e. 2.9 per cent. as compared with 3.22 per cent. for the previous year.

Two outbreaks of a mild form of chicken-pox occurred during the year, one at Kumasi and one at Tamale.

An epidemic of amoebic dysentery occurred at Zuarungu in May and June, 1928, with nine cases and five deaths.

Average Daily Lock-up.		*Sick List* (*average*).	
1924–25	1,390.57	1924–25	3.00%
1925–26	1,433.25	1925–26	3.10%
1926–27	1,620.25	1926–27	3.99%
1927–28	1,701.74	1927–28	3.22%
1928–29	1,806.85	1928–29	2.93%

Death-Rate.	Total.	Per cent of average daily lock-up.
1924–25	18	1.29%
1925–26	35	1.29%
1926–27	30	1.85%
1927–28	53	3.11%
1928–29	39	2.16%

Of the deaths, 14 occurred at Accra, 11 at Tamale and five at Zuarungu.

Recommendation :—For the future any new prison built should have individual cells and not association cells, in order to bring it into line with modern ideas of prison construction.

APPENDIX TO REPORT ON PRISONS.

SCALE OF DIET.

No. I.	No. II.	No. III.		Punishment.	European.	West Indian.	Infirmary.	
		5 days a week.	2 days a week.				Full.	Low.
*Kenki .. .. 2 lbs. Fish, fresh cooked 2 ozs. or Fish, salt cooked 3 ozs. or Beef, fresh cooked 1 oz. or Beef salt cooked 1½ ozs. Pepper .. ⅛ oz. Salt .. ¼ oz.	Kenki .. 2½ lbs. Fish, fresh cooked 3 ozs. or Fish salt cooked 4 ozs. or Beef fresh cooked 1½ ozs. or Beef salt cooked 2 ozs. Pepper .. ⅛ oz. Salt .. ¼ oz.	Kenki .. 2½ lbs. Fish, fresh cooked 4½ ozs. or Beef fresh cooked 1½ ozs. or Beef salt cooked 2¼ ozs. Pepper .. ⅞ oz. Salt .. ¼ oz.	Boiled Cassada 2½lbs. Fish, fresh cooked 3 ozs. or Fish salt cooked .. 4½ ozs. or Beef fresh cooked 1½ ozs. or Beef salt cooked .. 2¼ ozs. Pepper .. ⅛ oz. Salt .. .. ¼ oz. Palm Oil .. ½ oz. Vegetables .. 4 oz. The above articles of diet excepting the boiled cassada are to be made into soup.	No. I. Kenki .. 1½ lbs. Salt .. ¼ No. II. Kenki .. 1 lb. Salt .. ¼ oz.	*Per diem.* Rice .. 1½ lb. Bread .. 1½ lb. Fresh Beef cooked or Fowl cooked 1 lb. *or 3 days a week.* Fresh fish cooked .. ½ lb. or Fresh Beef cooked 1 lb. or Fowl cooked 1 lb. *Per week.* Tea .. ¼ lb. Sugar ½ lb. *4 days a week.* Eggs .. 2	Same diet as First and Second Class except that the Kenki or Cassada shall be reduced by ½ lb. in respect of which reduction Rice ½lb. or Agidi ½ lb. is to be substituted.	Kenki .. 2 lbs. or Rice cooked 1 lb. or Cassada cooked 3 lbs. or Fish fresh cooked 4 ozs. or Fish salt cooked 6 ozs. or Beef fresh cooked 2 ozs. or Beef salt cooked 2 ozs. Pepper ⅛ oz. Salt .. ¼ oz. Palm Oil ¼ oz. Vegetables. 4 ozs. Akassa 1 lb.	Kenki .. 2 lbs. or Rice cooked ¾ lb. or Cassada cooked 2½ lbs. or Fish salt cooked 4 ozs. or Beef fresh cooked 1½ oz. or Beef salt cooked 1½ ozs. Pepper ⅛ oz. Salt .. ¼ oz. Vegetables. 3 ozs. †Akassa 10 ozs.

All Native Prisoners are allowed 10 ozs. of boiled Akassa every morning, except when on No. 2.

1. Prisoners sentenced to 7 days and under, No. 1 diet, without fish or meat.
2. ,, ,, ,, to more than 7 days and not more than one month, No. 1 diet.
3. ,, ,, ,, ,, ,, 1 month and not more than six months, No. II diet.
4. ,, ,, ,, ,, ,, 6 months No. III. diet.
5. In case of Kroo men Rice to be substituted for Kenki at the following rate :—No. I, ¾lb. ; No. II. 1 lb. No. III. 1 lb. ; Punishment ¾ lb ; Infimary, Full, 1 lb. ; Low, ¾ lb.

Punishment diet, to be taken before the day's work is begun.

*Kenki consists of maize soaked in water, mashed and cooked.

†Akassa—a gruel made of maize.

CENTRAL ASYLUM, ACCRA.

The Staff of the Central Asylum, Accra, during the year consisted of—

1	Chief Attendant
1	Assistant Chief Attendant
17	Male Attendants
3	Female Attendants
1	Matron
1	Gate-keeper.

There is no other Asylum.

On the 31st March, 1929, there was a total of 246 inmates as compared with a total of 241 on the 31st March, 1928.

Statistics for the year are shown below :—

Remaining number of patients 31st March, 1928		241
Admitted during 1928-29		84
Discharged during 1928-29		32
Escape during 1928-29		1
Deaths during 1928-29		45
Number of inmates remaining 31st March, 1929.		
Males	155	246
Females	49	
Criminal Lunatics (Males)	42	

Deaths to the number of 45 were recorded as follows :—

Debility and exhaustion	6
Diarrhoea	3
Asthenia	4
Nephritis	1
Epilepsy	5
Pneumonia	2
Chronic Nephritis	1
Ankylostomiasis	3
Respiratory Failure	2
Gastric Hæmorrhage	1
Cardiac Failure	4
Leprosy	1
Cerebral Hæmorrhage	3
Beri Beri	1
Valvular diseases of the heart	1
Pulmonary Tuberculosis	3
Cachexia, Toxaemiac	1
Dysentery	3
	45

The mental diseases from which the inmates suffered were as follows:—

	Males.	*Females.*
Imbecility	30	5
Mania	80	18
Homicidal Insanity	31	—
Melancholia	6	2
Periodical Insanity	4	2
General Paralysis	1	—
Suicidal Insanity	7	1
Epilepsy	4	2
Dementia	8	6
Delusional Insanity	14	5
Under observation	11	8
	196	49

The general health of the inmates throughout the year was not unsatisfactory and no epidemic outbreak took place.

Plans for a new hospital for the Colony are in existence but construction is postponed till the plans are fully considered by the special Alienist officer, the appointment of whom for the coming year 1929-30 has been sanctioned by the Secretary of State.

VIII.—METEOROLOGY.

AVERAGE FIGURE FOR THE YEAR 1928-29.

Station.							Total Rain-fall.	Degree of	Wind.	
	Solar Max.	Min. on Grass.	Shade Max.	Shade Min.	Range.	Mean.	Amnt. in Inchs.	Hum.	Gen. Dir.	Av. Frce.
Accra ..	142.9	73.1	84.8	74.1	16.9	79.4	28.27	74.3	S.W.	5.9
Kumasi ..	145.1	—	88.7	68.8	27.9	78.8	58.22	82.8	Calm	.8
Sekondi ..	137.6	74.3	86.1	73.5	19.1	80.2	45.71	81.9	S	1.7
Tamale ..	151.2	66.4	93.2	69.8	30.5	81.5	40.35	63.9	S	2.3

METEOROLOGICAL OBSERVATIONS, LABORATORY GROUNDS, KORLE-BU.

Month.	Rainfall in Inches.	Highest Maximum Temperature Recorded.	Lowest Minimum Temperature Recorded.	Daily Average Mean Temperature.	Temperature of Dew Point.	
					Highest.	Lowest.
April 1928 ..	3.006	89	74	82.1	75.7	68.9
May 1928 ..	7.828	87	73	81	75.7	70.1
June 1928 ..	1.277	86	74	79	74.7	69.1
July 1928 ..	0.478	83	72	77.3	71.9	68.9
August 1928 ..	0.356	81	70	75.9	71.9	67.4
September 1928	1.491	81	71	76.6	72.6	68.5
October 1928	1.58	87	74	79.5	73.6	68.2
November 1928	0.03	86	74	80.9	74.7	68.9
December 1928	5.046	86	68	80.5	76.3	72.9
January 1929	0.284	89	67	79.3	76	44
February 1929	1.06	87	74	81.1	80	71
March 1929 ..	2.68	88	75	81.9	78	61

Total Rainfall 25.066 inches.

IX.—SCIENTIFIC.

(*a*) ANNUAL REPORT OF THE MEDICAL RESEARCH INSTITUTE, ACCRA, AND ITS BRANCHES.

As a result of the death of Dr. Young, at the end of May, 1928, the work of the Medical Research Institute became severely disorganised. Some months elapsed before the writer assumed duty and much difficulty was experienced in becoming familiar with the various lines of work going on and with the records. The writing of this report has therefore been found a somewhat unsatisfactory task, but an endeavour has been made to give a connected account of what has been accomplished during the year.

2. *The European Staff* has been as follows, any subsequent changes being detailed later.

One Director, Dr. W. A. Young (died 29th May, 1928).
Four Pathologists, Drs. Burgess, Robinson, Thomson and Russell.
One Medical Entomologist, Mr. Pomeroy.
One Assistant Entomologist, Mr. Morris.
One Laboratory Superintendent, Mr. Leeson.
Two Laboratory Assistants, Messrs Abbott and Woodward.

3. *The African Staff* has been as follows and the changes will be stated subsequently.

Three Laboratory Attendants, Messrs Paittoo, Bannerman and Nelson.

Four Entomological Laboratory Attendants, Messrs Nettey, Gray, Williams and Venkumuni.

One Second Division clerk, Mr. Marbel.

4. *The Labourer Staff* consists of nine, six of whom are employed within the Laboratories at Accra and Sekondi and three are groundsmen of the Medical Research Institute. One each of the indoor staff act as Mortuary Attendants in addition to their other duties.

5. *European Staff Changes.* It is with the profoundest regret I have to recall that Dr. Young died of yellow fever on May, 29th.

Dr. Butler was transferred from Nigeria on 26th August 1928 and took over the duties of Director from that date.

Dr. Burgess returned from leave on August 15th, having proceeded on leave from Sekondi (via Accra) on 10th March, 1928. Since his return to duty he has continued his researches on Plague Vaccine which he summarises to some extent in this report.

Dr. Robinson has been employed on the Tsetse-Trypanosomiasis investigation throughout the year and has been chiefly stationed at Yeji on the Volta River, in the Northern Territories. He submits his report in conjunction with the Medical Entomologist.

Dr. Thomson has been in charge of the Sekondi Laboratory throughout the year and submits below his report of the work done there.

Dr. Russell has been stationed at Accra throughout her year of service and proceeded on leave on March 6th, 1929. She has had the misfortune of having had much responsibility thrown on her shoulders as a result of Dr. Young's death so soon after she was appointed to this Colony. For three months she has had to take charge of the work in the Medical Research Institute single-handed.

Mr. Pomeroy, the Medical Entomologist has continued his investigations on Tsetse Fly and Cattle Trypanosomiasis throughout the year on the northern cattle route and submits a report which covers rather more than the year under review but his work cannot be satisfactorily divided into annual periods. Mr. Pomeroy visited French Territory during January, 1929, in compliance with a suggestion from the Secretary of State to encourage mutual exchange of ideas and progress made in anti-tsetse measures in adjoining territories.

Mr. Morris was appointed an Assistant Entomologist and arrived in the Colony, on December 20th, and having acquired a preliminary knowledge of the Entomological work that had been carried out at Yeji proceeded to the northern part of the cattle route to carry out observations on the anti-tsetse measures that had been inaugurated there during January and February, 1929.

Mr. Leeson has been employed for most of the year in Accra, and proceeded on leave on 11th, December, 1928, during which period he attended a course of instruction at the Liverpool School of Tropical Medicine.

Mr. Abbott was detailed for duty at Bawku on the north-eastern border to carry out an examination of cattle blood films as the cattle that are imported into the territory cross the border into the Gold Coast and he continued these observations until December, when he was required to relieve Mr. Leeson at headquarters.

Mr. Woodward has been employed as assistant to Dr. Thomson at Sekondi and remained in that position until November, 1928, when he proceeded on home leave, during part of which time he has been increasing his experience of bacteriological technique in Dr. Nabarro's laboratory at the Great Ormond Street Hospital for Sick Children.

6. *African Staff Changes.*—Mr. Paittoo's sphere of work has varied from being assistant at the Sekondi Laboratory to collecting and examining cattle blood films at Kumasi from which he was withdrawn in November to take over the preparation of material for histological examination at the Medical Research Institute.

Mr. Bannerman has been employed at the Medical Research Institute until he was transferred to Sekondi in October, 1928, after having passed an efficiency bar satisfactorily.

Mr. Nelson has remained on duty in Accra throughout the year, where he is chiefy employed in media making.

Messrs Nettey, Gray, Williams and Venkumuni have been employed at Yeji and elsewhere as Entomological Laboratory Attendants.

7. Permission was granted in October 27th to employ four *Laboratory Learners* from which date they have been on trial and if found satisfactory will eventually be absorbed into the ranks of the Laboratory Attendants.

8. *The Labourer Staff* requires mentioning to record the departure on pension of our Mortuary Attendant, Polba Mendi, who had well served the Medical Department for very many years.

9. *Visits of Inspection* to the Accra and Sekondi Laboratories and to the Tsetse Investigation Unit at Yeji were made by Dr. Stanton, C.M.G., Medical Adviser to the Secretary of State for the Colonies, during September, 1928.

The Director of the Laboratory made visits of inspection to Sekondi for short periods during September, 1928, and February, 1929, and also Yeji, during October, 1928, and to Kumasi, during October 1928, and March, 1929.

10. *Organization and Outline of Work.*—The Medical Research Institute is called upon to undertake very considerable quantities of what

are really routine examinations and though their importance to the patient cannot be over-estimated yet it seriously interferes with any organized lines of research.

So much so was this felt that when the new Director was appointed the following suggestions in brief form were submitted to the Honourable Director of Medical and Sanitary Service. That Pathologists should be stationed at Sekondi and in the Kumasi and Accra Native Hospitals to undertake for them all routine clinical laboratory examinations and that the Medical Research Institute should endeavour to carry out lines of research and undertake only such routine duties that the Pathologists at out stations were unable to deal with. These Pathologists would remain members of and be required to report to the Medical Research Institute in order that the presence of unusual findings may be noted, guidance given into channels that would appear to be profitable and uniformity maintained in technical methods and yet be in the position of of a liaison officer between the physician or surgeon and the Research Institute.

These suggestions have every sign of materialising.

11. Under the jurisdiction of the Medical Research Institute is the Sekondi Laboratory and the Tsetse Trypanosomiasis investigation unit. The Medical Research Institute at Accra deals not only with a good deal of the routine work of Accra but encourages the dispatch of specimens from all out stations while the Sekondi branch deals similarly with its district. The Mobile Laboratory is available for any duties that appear to require its services in the field and it has been so employed throughout the year with the Tsetse Trypanosomiasis unit in the Northern Territories.

12. The Laboratory buildings at Accra and Sekondi have remained unaltered through the year, but much requires to be done to the former to render it more convenient to work in for the rooms are ill arranged though commodious while the animal houses are dark and dungeon-like and unsuitable for animals to be kept and expected to breed in.

The special room that was built to allow plague investigations on a large scale with safety has fulfilled its purpose admirably and no disaster has occurred.

13. In making this report on the work of the Research Institute and its branches it is proposed to divide it up into the following sections.

(i) A report on the Routine Division at Accra.
(ii) A report on the Routine Division at Sekondi.
(iii) Reports from the Research Division which includes as appendices the Tsetse Trypanosomiasis Investigation Report, Report on Plague Vaccine problems and other smaller items.

14. REPORT OF THE ROUTINE DIVISION AT ACCRA.

(*a*) Examination of *Blood Films for Parasites* has reached a total of only 477 with the following results and approximate percentages

Subtertian in 142 or 30 %
Quartan in 11 or 2.3 %
Relapsing Fever in 3 or .62 %
Crescents in 12 or 2.5 %
Trypanosomes in 1 or .2 %
Microfilaria in 5 or 1 %

These totals are much too small to convey much information but I suspect the malaria index is nothing unusual or different from other Coast towns. The low Microfilaria rate is in great contrast with the figures commonly seen in other West Coast Colonies.

(*b*) *Blood Counts.*—These are not commonly required.

Differential counts have reached a total of 42 and their value in general appears not to be very evident.

Total counts on Red and White cells similarly are not in demand, only seven of each having been made. Haemoglobin estimations also have only been performed on eight occasions.

(*c*) *Blood Cultures.*—This most useful proceedure has not been a feature of the work but they have had a tendency to increase in the last few months, since their value in the diagnosis of the Enteric group was appreciated.

Thirteen samples have been examined, eight being found sterile while the remainder showed Staphylococcal infections in three and Typhoid infection in two.

(*d*) *Widal Reactions* have been in fair demand a total of 93 having been made with the following results.

T. A. B. negative	59
Positive to B. typhosus	23
Positive to B. para B.	5
Group Reaction for Enteric group ..	6

(*e*) *Wassermann Reactions and Flocculation Tests.*—These are in great demand and occupy much time: the following totals have been reached for examinations on sera.

Wassermann Reactions	2,074
Sachs Georgi Reactions	429

Cerebro-spinal fluids have been examined by one or the other of these methods on 31 occasions. Kahn's test has been tried in a few cases but have not been recorded; it has many advantages and might well be performed in routine manner.

The results of these sets of tests may be tabulated according to the readings obtained as far as possible in three groups.

	Wassermann	Sachs Georgi.	Totals.
Strongly Positive	823	117	940
Positive ..	325	96	421
Negative ..	926	216	1,142
	2,074	429	2,503

The remarkably high positive figures should be noted.

(*f*) *Examination of Faeces.*—A total of 864 samples have been received which is about the usual number received during previous years. Infestation with helminths is indicated by the following figures and approximate percentages.

Ascaris ova in	171 or	20%
Hookworm ova in	162 or	18%
Taenia ova in	16 or	1.8%
Schistosoma mansoni ova in ..	3 or	.34%
Hymenolepis ova in	2 or	.23%

Hookworms were collected from eleven human post-mortems in order to note the variety encountered. Out of a total of 53, 50 were Necator americanus and 3 Ankylostoma doudenale.

One hundred and eight specimens could be classified as showing evidence of dysentery and the findings in these cases are as follows :—

Entamoeba histolytica in	32
B. dysenteriae Flexner in	9
B. dysenteriae Shiga in	1
B. dysenteriae Schmitz in	1
Lamblia in	6

No less than 59 failed to reveal the cause of the condition but from my previous experience they can I think with little doubt be placed among the bacillary group and I expect it will be found that on the Gold Coast as has already been found in Sierra Leone and Lagos that the bacillary type of dysentery is the prevalent type.

Flagellates are of course commonly found and lack of evidence of their pathogenicity has prevented any serious attention being spent on the types that predominate.

Bacteriological examinations of faeces, apart from the dysentery group, has been made for members of the enteric group on 17 occasions, B. typhosus being isolated in two instances.

(*g*) *Urine Examinations.*—These are rarely requested unless some special observation is required. 102 specimens were received for general examination among which 39 showed the presence of Bilharzia ova.

Twenty-two samples were submitted for Bacteriological examination eighteen of which were negative in result and the remaining four revealed two B. coli infections, a B. typhosus infection and an infection with a paratyphoid-enteritidis type of organism that is inagglutinable with the ordinary standard sera but shows a low agglutination with the patients blood : this organism is still being investigated.

(*h*) *Examination of Pus.*—Out of a total of only 48 samples 37 were for simple microscopical examinations all but one being an examination for gonococci.

The remaining eleven were bacteriological investigations of abscess material of which six were sterile the remainder showing the ordinary pyogenic organisms.

(*i*) *Sputum Examinations.*—A total of 156 were examined with the following results :

Negative	119
Tubercle Bacilli present	29
Pneumococci in quantity	4
Spirochaetes and fusiform Bacilli ..	4

(*j*) *Miscellaneous Examinations.*—This comprises all those various examinations performed in a Laboratory insufficiently numerous to be given separate headings.

The more numerous examinations have been with samples of cerebro-spinal fluid, sixty-five samples having been submitted 23 of which were for cell counts, 35 for protein examinations, and five for trypanosome examinations, one of which was positive. The other 35 examinations include throat swabs, effusions of various kinds, nasal and skin smears and disinfectant examinations and are not of sufficient interest to describe.

The preparation of two vaccines may be mentioned under this heading.

(*k*) *Post-Mortem Examinations* are made at the request of the coroner and the various hospitals: the number under coroners orders total 66 while the hospital cases account for 68. The total of 68 from the hospitals is much lower than I should like and much interesting material must be escaping.

The table that follows brings into prominence the main cause of deaths as injuries (which are largely lorry accidents) pulmonary tuberculosis, pneumonia and nephritis.

Four cases diagnosed as toxaemias of pregnancy suggests a line of investigation.

It is hoped to be able to record some of the more interesting cases in detail in future reports.

Post-mortems—

Under Coroner's order	66	
Others by request	68	Total 134.

(i) Unnatural Causes 26.

Injuries	16
Strangulation	1
Suffocation	1
Poisoning	5
Drowning	1
Abortion	1
Snake Bite	1

(ii) Natural Causes 103.

Septicaemia	6
Typhoid Fever	4
Relapsing Fever	1
Trypanosomiasis	2
Yellow Fever	2
Anaemia (various causes)	4
Generalized Tuberculosis	1
Pulmonary Tuberculosis	11
Abdominal Tuberculosis	2
Pneumonia	7
Broncho-Pneumonia	3
Bronchitis	2
Endocarditis	2
Angina and Atheroma	3
Aneurysm	2
Myocarditis	2
Pericarditis	1
Cardiac Failure	1
Liver-Cirrhosis	2
Nephritis	7
Pyonephrosis	1
Uraemia	1
Dysentery Amoebic	3
Dysentery Chronic	1
Ulcer of Bowel wall (Peritonitis)	2
Acute Enteritis	1
Carcinoma Stomach	1
Carcinoma Bladder	1
Lymphosarcoma	1
Status Epilepticus	2

Convulsions	1
Cerebral Hæmorrhage	2
Meningeal Hæmorrhage	2
Meningitis Cerebro-Spinal	1
,, Tubercular	1
,, Pneumococcal	3
,, Streptococcal	1
Cerebral Abscess	1
Ectopic Gestation (ruptured)	3
Toxaemias of Pregnancy	4
Ruptured Uterus	1
Still Birth	1
Status Lymphaticus	1
Delayed Chloroform Poisoning	1
Mycosis of Spleen(?)	1

(iii) Undiagnosable owing to decomposition	5

(*i*) *Tissues Sectioned and Histological Work.*

From man	376
From Rhesus monkeys	93
From various animals	77

The tissues comprise most parts of the body and it is not necessary to mention them in detail.

Tumours that have been sectioned number 28, nineteen of which were malignant, viz.:—

Carcinoma	12
Sarcoma	3
Melanotic Sarcoma	1
Lymphosarcoma	3

The tissues from Rhesus monkeys have been entirely in connection with Dr. Noguchi's experimental work on Yellow Fever—the liver and kidney being handed to Dr. Young to clinch or exclude the diagnosis. The tissues from various animals were derived largely from Dogs and Cricetomys gambianus in the progress of a search for various parasites.

A series of tissues were cut and stained for fat by the Osmic acid method, portions of liver, kidney and heart muscle being selected in order to obtain some idea of the prevalence of similar fatty changes in other conditions than Yellow Fever. The investigation is by no means complete and will be followed in a routine manner until a considerable amount of material has been examined.

At present 35 cases have been examined in this way chiefly septicaemic types of illness or obscure cases and in no case except relapsing fever and the toxaemias of pregnancy has the liver picture resembled Yellow Fever in any way, the fatty changes in the Heart and Kidney however may be found to be similar to Yellow Fever in many other diseases.

(*m*) *Water Examinations.*—A table follows showing the number of times B. coli was found in the smallest volume of the sample supplied.

Source.	c.cs.					
	No. Exd.	Absent.	100	10	1	0.1
Laboratory Tap.	50	45	5	—	—	—
Storage No. 1	8	6	—	2	—	—
Storage No. 2	15	7	8	—	—	
Final Filter No. 1	10	8	1	1	—	—
Final Filter No. 2	7	6	1	—	—	—
Final Filter No. 3	8	8	—	—	—	—
Final Filter No. 4	10	9	1	—	—	—
Final Filter No. 5	9	8	1	—	—	—
Final Filter No. 6	8	8	—	—	—	—
Soda Water	6	4	2	—	—	—
Alumina Outfall	1	—	1	—	—	—
No. 1 Low Level Tank	2	1	1	—	—	—
Totals	134	110	21	3	—	—

(*n*) *Examination of Rats and other Animals.*—The former are submitted by the Medical Officer of Health primarily for the exclusion of Plague. No microscopical examination has been made except in case of a death—the majority being kept alive under observation and subsequently used for inoculation and experimental purposes. The figures are as follows and no B. pestis infection has been recorded.

	C. gambianus.	R. rattus.	R. norvegicus.	Totals.
April, 1928	91	25	6	122
May, 1928	92	32	4	128
June, 1928	81	13	5	99
July, 1928	68	43	8	119
August, 1928	54	50	11	115
September, 1928	61	61	12	134
October, 1928	78	55	11	144
November, 1928	118	25	7	150
December, 1928	97	31	7	135
January, 1929	90	42	12	144
February, 1929	102	32	2	136
March, 1929	100	18	6	124
	1,032	427	91	1.550

The Examination of Polo Pony Blood Films has been carried out periodically for trypanosome infection. During the examination of stray Dogs for other conditions opportunity of examining the types of Hookworm present has been made.

A total of only 79 has been obtained with the following findings.

Ankylostoma Caninum	....	26
Ankylostoma braziliense	..	53

(*o*) *Entomological Records.*—These have been kept and compiled by Dr. Russell.

[i] Anophelines found in the quarters attached to the Medical Research Institute.

Month.	Collections received.	A. pharoensis.	A. funestus.	Totals.
April, 1928	20	94	20	114
May, 1928	19	145	14	159
June, 1928	11	66	32	98
July, 1928	13	149	38	187
August, 1928	0	25	126	151
September, 1928	13	37	5	122
October, 1928	7	—	22	22
November, 1928	4	3	6	9
December, 1928	12	21	30	51
January, 1929	8	6	16	12
February, 1929	13	9	66	75

The predominance of A. pharoensis from April to July is notable followed by the predominance of A. funestus for August and September.

Very occasionally A. costalis, A. gambiae and A. Mauritianus have been caught.

(ii) *Culicinae.*—Aedes argenteus has not been found during the above period in the neighbourhood of the Medical Research Institute.

Samples of larvae sent by the Medical Officer of Health's staff have bred out A. argenteus in 78.4 per cent. of occasions.

15. REPORT OF THE ROUTINE DIVISION AT SEKONDI.

Owing to the increasing amount of routine work, no definite research work has been attempted, but a serological investigation has been carried out on dysentery cultures obtained in Accra last year and in Sekondi this year.

(i)	*Blood Examinations*		1,664
	(*a*) Parasites found in		667
	(*a.*) P vivax		9
	(*b.*) P malariae		17
	(*c.*) P falciparum		636
	(*d.*) P vivax and P.falciparum		5
	(*b*) Differential leucocyte count		25
	Total Erythrocyte count		10
	Total Leucocyte count		7
(ii)	*Urine Examinations* (*General*)		240
	S. haematobium found in		2
(iii)	*Widal Tests*		37
	Positive for B typhosus	1/125	2
	,, ,, ,, ,,	1/250	2
	,, ,, ,, ,,	1/500	1
	,, ,, ,, ,,	1/2,500	1
(iv)	*Kahn Precipitation Tests*		54
	Positive (+++)		25
(v)	*Sputum Examinations*		224
	B. tuberculosis found in		29
(vi)	*Smears.—Microspical examinations* ..		104

	Gonococci.	T. pallida.	Koch-Week's Bacilli.	Ducrey's Bacilli.	Spirochaetes and Fusiform bacilli.
Eye	7	—	5	—	2
Throat	—	—	—	—	2
Urethra	22	—	—	—	—
Vagina	5	—	—	—	—
Ulcers	—	5	—	3	8

(vii) *Water Samples—bacteriological examinations*	309
(*a*) Anglo-African Aerated Waters Ltd.	54
(*b*) Railway Soda Water Factory	35
(*c*) Inchaban Reservoir	
a. Raw	50
b. Final Filter	60
c. Main	2
(*d*) Laboratory Tap	20
(*e*) Takoradi :	
a. Residential Supply	35
b. Harbour ,,	36
(*f*) Insuta	14
(*g*) Native Village Well	1
(*h*) Reservoir Essikadu :	
Inlet	1
Outlet	1
(viii) *Miscellaneous examinations*	78
Blood cultures	10
Pus	27
Skin Scraping	10
Vomit	4
Various Smears	10
Blood Stains	7
Dogs Blood Films	10
(ix) *Examination of Rats for Plague*	2,978
All Negative.	
(x) *Faeces Examinations*	801

	Hospital and Clinic.	Central Prison.	Total.
No. of specimens sent	338	463	801
Negative findings	198	111	309
Positive findings	140	352	492
E. histolytica and /or cysts	12	7	19
Charcot Leyden Crystals	3	0	3
E. coli and /or cyst	24	183	207
I. butschlii and /or cysts	1	4	5
Dientamoeba fragilis	0	1	1
Endolimax nana	1	0	1
Ascaris ova	30	68	98
Trichuris trichura ova	3	17	20
Hookworm ova	22	42	64
Taenia ova	3	9	12
Oxyuris vermicularis ova	0	3	3
S. mansoni	1	0	1
Flagellates	14	140	154
Strongyloides larvae	7	9	16
Balantidum coli	1	0	1
B. dysenteriae (Flexner)	24	6	30
B. dysenteriae (Sonne iii)	1	0	1
B. morgan No. 1	1	0	1
Mite (Tarsonemus)	0	1	1

(xi) *Post-mortem Examinations.* 98.

Heart.

(*a*) Myocardial degeneration and/or V.D.H.	8
(*b*) Rupture of Aortic Aneurysm	1

Lungs.

(*a*) Tuberculosis	6
(*b*) Lobar Pneumonia	23
(*c*) Empyema	1
(*d*) Bronchiectasis	1

Brain.

(*a*) Cerebral Abscess	1
(*b*) Encephalitis (Trypanosomiasis ?)	1
(*c*) Rupture of middle meningeal Artery	1

Liver.

Cirrhosis	3

Kidney.

Acute Nephritis	1
Chronic ,,	2

Dysentery.

(*a*) Chronic Amoebic	2
(*b*) Infantile diarrhoea	1
Milliary tuberculosis	3
Peritonitis	3
Marasmus	2
Haemorrhage from Uterine Hydatid Mole	1
P.U.O.	1
Poisoning by A.B.C. liniment	1
Gunshot Wounds	2
Hanging	4
Drowning	10
Shock by Electricity	3
Rupture Spleen (Traumatic)	3
,, Lungs ,,	1
,, Uterus (obstructed labour)	1
Fractured Skull	3
,, Neck	1
Various Wounds	2
Burns	2
Cause Unknown due to decomposition	3

(xii) *Sections.* (Including Tumours) 68.

Liver	11
Lungs	9
Kidney	7
Spleen	5
Heart	1
Aorta	1
Glands	6
Brain	2
Pancreas	2
Skin	4
Bone	1
Thyroid	1
Thymus	1
Suprarenal	1
Intestine	1
Uterus	1

Tumours. 14.

Fibroma	3
Adenoma	1
Neuroma (Amputation)	1
Lympho-sarcoma	1
Melanotic sarcoma	1
Mixed cell sarcoma	1

Epithelioma (lip)	1
,, (penis)	1
,, (Cervix)	1
Branchial Cyst	1
Hydatidiform Mole	1
Retention Cyst Salivary Gland	1

(xiii) *Bacillary Dysentery.*—The non lactose fermenters obtained from dysentery cases in Accra during the period March 23rd—August 31st, 1927 and from cases in Sekondi from April 1st, 1928—March 31st, 1929, have been thoroughly investigated and the results tabulated as follows.

Material.	Microscopical Diagnosis.	Total No. of Cases.	Negative Cultures.	Positive Cultures.	Organisms Isolated.
Faeces ..	Typical Bacillary	73	12	61	B. dys. Flex .. .. 49 B. dys. Shiga .. .. 1 Schmitz bacillus .. .. 4 Sonne iii .. .. .. B. faecalis alkaligenes .. 4 Undetermined N.L.Fs. .. 2
Faeces ..	Suggestive Bacillary	19	10	9	B. dys. Flex .. .. 4 B. faecalis alkaligenes .. 3 Sonne iii .. .. .. 1 Undetermined N.L.Fs. .. 1
Faeces ..	Liquid stool of no definite type	2	—	2	Morgan No. 1 2
Colon Post-mortem	Bacillary Ulcers	2	—	2	B. dys. Flex .. .. 1 B. faecalis alkaligenes .. 1
Total ..		96	22	74	74

(xiv) *A case of Enteritis due to B. pyocynaneus.*—Blood films from an European in Cape Coast were examined on three occasions during the last fortnight of December, 1928—No parasites were found but differential leucocyte Counts revealed an increasing relative lymphocytosis of 45–60 per cent.

Blood serum was then examined on January 5th for the Widal reaction resulting in an agglutination of one in 250 for B. typhosus (Oxford standard suspension)—Patient had received T.A.B. vaccine in 1915.

Cultures from the faeces on January 11th gave practically pure plates of non lactose fermenters which agglutinated with Oxford Standard Typhoid serum in a dilution of one in 160 and with the patients serum in 19,200.

The morphological cultural and biological characters of the organism were that of B. pyocyaneus.

16. REPORT FROM THE RESEARCH DIVISION. These are attached in the form of appendices.

Appendix A. Concluding events in the work on Yellow Fever in Accra.

Appendix B. Tsetse Trypanosomiasis Investigations by Mr. Pomeroy and Dr. Robinson.

Appendix C. Report on Cattle Films taken in Accra by Dr. G. G. Butler.

Appendix D. Plague Experiments by Dr. A. S. Burgess.

Appendix E. Preliminary Report on Malaria in Parturient Women, by Drs. Russell and Butler.

Appendix F. Preliminary Report on some experiments with Hookworms by Dr. Russell.

APPENDIX A.

Concluding Events in the Work on Yellow Fever in Accra.

It is necessary for me to make a brief note on this subject for a portion of the work overlapped into the year under review and it is thought advisable to record the events as far as possible leading up to the deaths of Drs. Noguchi and Young.

Until the latter end of May a large portion of the Institute buildings had been allocated to the use of Dr. Noguchi and his work no doubt will be reported in due course elsewhere.

The Medical Research Institute was concerned in this work to the extent of examining most of the post-mortem material obtained from the experiments on Macacus Rhesus Monkeys and in the period under review consisting of April and most of May, 1928 sections were reported upon but unfortunately the notes are scanty usually consisting only of the diagnosis "typical Yellow Fever" so that it is impossible to report further upon them. Actual experimental work with monkeys appears to have only been in the hands of Dr. Noguchi. On May 9th Dr. Noguchi went to Lagos to pay a rapid visit to the Commission there before sailing for Europe.

On May 11th on the return journey to Accra he was taken ill and on landing the next day was removed to the European Hospital. The diagnosis of Yellow Fever was made the same evening. He died on May 21st after an unusually long illness. Fumigation of the rooms and animal houses at the Medical Research Institute in use by Dr. Noguchi was carried out on May 21st and 22nd, Dr. Mahaffy and Dr. Young deciding what material should be kept and what animals destroyed.

On midday on May 26th Dr. Young became ill and Yellow Fever being diagnosed the Laboratory was closed on May 27th and fumigated on May 28th, a second fumigation taking place on May 30th the day after Dr. Young's death and the remaining animals were destroyed. The Laboratory was re-opened on May 31st.

All Dr. Noguchi's cultures, tissues and records were sent to New York and with the exception of some apparatus the remaining equipment of the Commission was returned to New York or Lagos. We shall wait for a report on Dr. Noguchi's work sincerely hoping that much advance will come of work which has been so costly. The sequence of events during this unfortunate time is best displayed in chronological order.

May 9th 1928,	Dr. Noguchi left for Lagos.
,, 11th ,,	Dr. Noguchi sails from Lagos to Accra.
,, 12th ,,	Dr. Noguchi arrives from Lagos sick and taken to European Hospital, Accra, and diagnosis of Yellow Fever made.
,, 13th ,,	Monkey No. 1224 inoculated with 1 c.c. pure blood from Dr. Noguchi in 2 c.c. citrated saline.
,, 16th ,,	Monkey No. 1224 bled from saphenous vein and transferred to Monkeys No. 1225 and 1226.
,, 19th ,,	Monkey No. 1224 bled and inoculated into Monkey No. 1226 again.

May 20th 1928. Monkey No. 1224 died 11 p.m.

,, 21st ,, Post-mortem on Monkey No. 1224 by Dr. Young at 9 a.m. Dr. Noguchi died at 12 noon. Post-mortem by Dr. Young shortly after. Fumigation of Dr. Noguchi's Laboratory and animal house extension.

,, 22nd ,, Fumigation of Dr. Noguchi's Laboratory and animal house extension continued.

,, 23rd ,, Monkey No. 1228 inoculated with 2 c.c. of blood obtained at Dr. Noguchi's post-mortem.

,, 26th ,, Dr. Young is taken sick midday.

,, 27th ,, Monkeys No. 1225, 1226 and 1228 destroyed and Laboratory closed.

,, 28th ,, Fumigation of Laboratory buildings.

,, 30th ,, Second Fumigation of Laboratory buildings.

APPENDIX B.

THE TSETSE PROBLEM AND TRYPANOSOMIASIS ON THE EASTERN CATTLE ROUTE IN THE GOLD COAST.

I. ENTOMOLOGICAL REPORT BY MR. POMEROY.

Various species of Glossina are widely distributed throughout the Gold Coast Colony and the Protectorates of Ashanti and the Northern Territories, and though there are undoubtedly endemic centres of human and animal trypanosomiasis, yet the disease does not appear to possess the virulence and cause the terrible loss to man and animals, which is occasioned in certain other parts of Africa.

2. Nevertheless, the problem is a serious one, as trypanosomiasis undoubtedly inhibits the development of stock breeding and the toll taken of human life from this cause may be greater than at present conjectured. Epidemics of sleeping sickness may bring the danger into prominent notice, but the insidious effect of the milder form of the disease may be no less serious amongst the comparatively small population of the Gold Coast, especially since there is no compulsory registration of death in the Northern Territories and there is great difficulty in recording death from this cause in the outlying districts. The population however in some of the endemic areas is so small, less than one to the square mile, that I venture to say that Tsetse control measures are almost impossible at the present time in most of these districts.

3. The practicability of controlling Glossina on the main cattle route, from French Territory, however, presents a very different economic aspect, and this article mainly deals with this problem.

4. The investigation discussed in this paper extended from November, 1926 to March, 1929.

5. The bulk of the meat supply of the Gold Coast is imported from the French Territory of the Haute Volta, 40,000 head of the cattle being imported yearly, most of which pass down the Eastern cattle route, through the Northern Territories to Ashanti and the Colony. The ultimate market value of this import is nearly half a million pounds.

6. Thirty days, on an average, are spent in French Territory en route from the cattle breeding areas, to the Northern Territories border, the cattle doing from twenty to twenty-five miles a day. Nine days are spent in quarantine at the border, and from twenty to twenty-two days are spent en route from there to Kumasi and the Ashanti markets.

7. The cattle are nearly all of the Zebu, or large humped type, which are very susceptible to trypanosomiasis, and with the rigour of the driving down and the effect of the disease, usually present a very emaciated and sorry appearance on arrival at the ultimate market. The loss in weight and quality of the meat is an important point apart from actual mortality.

8. The point arose as to whether the bulk of the infection took place in French Territory, prior to entry into the Gold Coast, in which case the value of remedial measures in the Gold Coast would be considerably lessened, though the vicious circle of the infection from the passing cattle to the fly and vice versa, adds to the total infection in the cattle. Statistics were obtained by taking blood examinations at the border, marking the cattle and examining the cattle half way down the route at Yeji, and again at the slaughter house at Kumasi. It was found that the infection at the border was constantly much lower than at any other point, that during the dry season, when the bulk of the cattle are imported, the infection rate at the border was remarkably low and that an increase of as high as 60% took place during July at Kumasi. The species of trypanosome were T. vivax, T. congolense and T. brucei, T. vivax was predominant.

9. During the rains in August, comparatively few cattle are imported, and there is a sudden and remarkable rise in the infection rate, probably due to the fact that the cattle have collected and been held for some time in a Tsetse infested area prior to import. Table No. 2 gives the figures which have been collected to date.

10. Soon after the cattle leave the French border they commence to pass through belts infested by Glossina and become increasingly infected with trypanosomiasis as they proceed South.

11. These Glossina belts are very well defined and are confined to the fringing vegetation of the rivers and streams.

12. The following species of Glossina were found at various points on the cattle route. G. palpalis Robineau ; G. tachinoides Westwood ; G. submorsitans Newstead ; G. longipalpis Wideman ; G. caliginea Austen ; G. medicorum.

13. The species of economic importance on the cattle route are G. tachinoides and G. palpalis. G. submorsitans is a negligible factor on the cattle route and after careful search has only been found in very small numbers near the route. G. medicorum may be of importance at the Volta River at Yeji, but seldom leaves the dense shade. Other species have been rarely met with to date, the problem of Tsetse control on the cattle route therefore presents some unique features as it is restricted to control measures of species apparently dependent on one type of environment.

The Bionomics of G. Palpalis.

14. The habitat of this species appears to be restricted to the tall vegetation, and fringing shade, of rivers and small streams. The fringing shade, with the exception of the Volta River, seldom extends more than twenty yards deep along the banks of the streams. It is composed mainly of trees of the Genus Ficus, etc., whose overhanging branches and aerial roots form a dense matted covering, with a superimposed shade of occasional tall trees. During the dry season from the end of October to the end of May the streams dry up and dwindle until the stream beds consist of a series of pools enclosed by overhanging banks, the bases of which are usually sandy. Progress along the stream beds may be compared to walking through a vault

like tunnel, and the covering mass of twisted aerial roots and vegetation above and the fallen trunks and logs below afford an ideal breeding ground for the fly. During the rains, these streams become swollen very rapidly, rise for a great height and often flood the surrounding terrain for some miles. The breeding period of the fly are definitely governed by this phenomenon. Breeding takes place intermittently during the dry weather and with the first showers of rain in May definite rise takes place. There is usually a period of comparatively dry weather between the beginning of the rains and the true rainy season, and it appears that it is during this period, that the bulk of flies are produced, which survive until the floods subside and breeding grounds are again available. The floods this year (1928) were very extensive and any pupae existent in the ground in the usual breeding areas, must have been destroyed with the exception of a very few localities. No evidence was obtained in October that breeding took place beyond the flooded area and it may be noted that the necessary shade was absent. On the other hand the flies were taken continuously at the edge of the flooded area and in the flooded area itself.

15. During the last two weeks of September and the first part of October no pupae were obtained from wild flies caught and kept to breed in the Laboratory though these were kept and fed in the usual manner.

16. As soon as the flood subsided, there was a marked increase of new flies during the middle of November. During the rains the majority of the flies were old flies.

17. The actual breeding habits have been amply described by several workers but in the areas discussed here, the most suitable site for pupation appears to be under fallen logs in light, sandy or loam soil, where there is a fair proportion of moisture. As many as forty pupal cases have been found under one log. Some of the situations seem to be especially preferred, as many logs and likely situations have been carefully examined with no result, while a half buried log tilted at one end, in fairly dense shade, may yield numbers of pupae.

18. Further study of the factors governing pupal distribution would be most valuable, but needs continuous and pains-taking labour over a long period to reach a definite conclusion.

19. Some interesting observations have been made with regard to the range of flight and the influence of the surrounding terrain. The crossing over the Mobari River at Mogonori, the border quarantine station, has been almost denuded of shade trees by the local inhabitants. From my own observations in the dry season and from information given by District Commissioners and Mr. Abbott, Laboratory Assistant, this area is Tsetse free continuously. Five or six miles down stream where this tributary joins the Volta River there is a primary breeding centre in the tall and dense shade of the stream. Migration during the rains does not appear to take place up this tributary, which floods its banks.

20. A similar condition obtains, at another point on the crossing over the Morahgo River lower down the route. I have spent many hours attempting to find palpalis crossing the cleared spaces, with no result, though at the last named point palpalis were to be found at any time in the dense shade half a mile away. Similarly the species is not found crossing the open meadow spaces which form the basin of the swamps near the streams and never ventures more than a 100 yards or so from the shade, unless following animals passing through. Even then, the Tsetse soon leave their host in the direct sunlight. It is this phenomenon which gives a definite basis for the use of clearing

as a control and as a prophylactic measure. Five hundred yards of cleared space on either side of a stream crossing should reduce attack of negligible quantity.

21. When proceeding by canoe on the Volta, palpalis voraciously attacks near the banks, in mid-stream however, where the river is 500 yards wide, there is almost complete immunity, though individuals collected from near the shore may follow for a time, resting in the shaded side of the canoe. While G. palpalis may be found at every shaded stream-crossing there are many miles of the route free of infestation. These shaded streams are not very numerous across the Northern half of the route and the area to be cleared works out at approximately 32 acres at each point.

G. Tachinoides.

22. G. tachinoides and G. palpalis are associated with the same environment. The pupae are often found together, though tachinoides often pupates in the earth and debris in the hollows of trees and stumps. From numerous observations the pupae may be dropped over a much wider field, and this species does not appear to be so dependent on thick shade for its existence. It is not a frequenter of open spaces and though undoubtedly found farther from its breeding place than G. palpalis, it is at present essentially a riverine species on the cattle route and is restricted by the same clearing measures, which are applied to G. palpalis. It is the most abundant species of all.

G. Submorsitans.

23. From evidence obtained it appears that this species is a negligible factor since it has been found at only two points near the cattle route, and its existence was due to the migration of game to the rivers during the dry season. Formerly the main north road, adjacent to which the cattle route runs for many miles, was undoubtedly infested with *G. submorsitans*, but the continuous motor traffic to-day, has driven away the game and the fly has disappeared in consequence. My experience in other parts of Africa is, that when morsitans is prevalent, that it will always follow the attack and occupants of a motor vehicle. After two years of observation no instance is recorded of this species being on the motorable part of the road. Three specimens only were found at Makongo on the River Volta in 1926, in the dry season, not on the actual route itself, game being plentiful two miles from the village, and after careful search with trained fly boys none have been taken from June to December, 1928, during the rains. The floods had undoubtedly driven off the game far back to higher ground. At Suguri crossing the numbers of native traders and travellers, passing down the route undoubtedly frighten the game away for some distance, and have the same effect. I have traversed both of the areas in every direction and found this species to be remarkably scarce, only thirty specimens being obtained after weeks of search with trained fly boys and these were taken a mile or more from the route. There are certain bits of country westward, which appear to be heavily infested with these species, but in these areas game is very prevalent and the population almost nil.

G. Medicorum.

24. This large species inhabits the dense shade of the thickets and tall trees fringing the River Volta. It cannot be said that it is really abundant, but thirty to forty specimens have been taken from time to time in six months. It has been found following the cattle for three quarters of a mile, but it is very local in its distribution. It is probably

crepuscular in its habits, and it has never been found leaving the dense shade to attack and all specimens were taken in the darkest part of the thickets with the two exceptions found following the cattle, which had been resting there. It attacks readily if the host is stationary, and the bite is very severe. The pupae are found under large logs, together with G. palpalis, in the tall and heavy vegetation by the river bank.

G. Longipalpis.

25. Isolated specimens have been found in conjunction with G. submorsitans in only two localities on the cattle route. Its habits appears to be very similar to the latter species, and it appears that game is its primary host. It has not been found breeding.

G. Caligines.

26. This species has been taken once in the thick forest of Ashanti, at the very southern end of the cattle route. Sufficient data is not available as to its frequency and distribution there, but it has not been found in the open savannah country, or the river shade of the Northern Territories.

The general terrain along the cattle route, the important points of infestation and game incidence.

27. The entire cattle route in British Territory is approximately 340 miles from the border to Kumasi. The Tsetse free area near the border is densely populated, with very few trees, and well cultivated. Infestation commences twelve miles southwards, at a small river, the Tamne River, fringed with thick vegetation. Savannah country interspersed with bare laterite out croppings and crossed by occasional small streams maintains until the River Volta is reached, where the vegetation is more luxuriant though confined to a narrow strip either side of the banks. The forest country commences eighty-three miles from Kumasi, the line of demarcation being very abrupt. While tsetse are found at nearly every stream crossing, large stretches of the route are completely free. G. fusca and G. nigrofusca are present in the rain forest belt, with occasional palpalis areas near the stream where the growth is less dense. The areas seem to be very localised, but further study must be made of these conditions. Game is abundant on the route at only two localities, at the Nasia River near Suguri and a short distance North of the Volta River. The species include the West African Buffalo, Hippopotamus, and the large and small Antelopes, Roan, Hartebeste, Cob, Waterbuck, Duiker, Oribi, Carnivores, wild pigs and monkeys are also found. The smaller Antelopes and monkeys are widely distributed, but apart from game there is a continual food supply afforded by the passing cattle and human beings who rest in the shade at the streams. Thousands of labourers migrate from French Territory to seek work in the Cocoa season, to return after they have completed their labour.

Pupal periods of Laboratory bred Tsetse.

28. During the rainy season the minimum pupal period was nineteen days and the maximum forty six days. The following table shows the monthly average for both sexes of G. palpalis and G. tachinoides. Reproduction seems slow at this period even though conditions were

favourable to development, as the earth in the jars was kept fairly damp and the temperature at approximately the same degree as the normal shade in the field.

	July.	Aug.	Sept.	Oct.	Nov.
G. palpalis Male	27	31	33	27	—
,, ,, Female ..	33	27	29	25	—
G. tachinoides Male ..	—	29	30	—	—
,, ,, Female ..	—	27	28	—	—

The periods are reckoned from the date the pupæ were deposited extending to the next month. On an average the males take longer to emerge than the females.

Human Trypanosomiasis.

29. In my Report No. VII—1927–1928, Sessional paper, para 8, I suggested that in certain areas of the Gold Coast, where there were endemic areas, that the population was so small as to prohibit any prophylactic measures being undertaken with regard to the fly. The problem however of human trypanosomiasis on the main trade and cattle routes presents a very different state of affairs. Not only does there appear to be an increase of population in the towns along these routes, but a very large and increasing annual migration is taking place from French Territory.

30. We have a very concrete example in the case of Makongo, of the possible importance of endemic areas on main trade routes. An examination of the population by Dr. Oakley showed 6½% (8 cases) of the people to be infected with trypanosomiasis. Thousands of migrating natives rest at this point en route to the labour markets of the South. As there is no compulsory registration of death, I suggest that when this labour disperses into the remote parts of the forest of Ashanti that it is very difficult to estimate the result of any infection which might be contracted at such a halting place, especially as the opinion seems to be that the disease takes some time before it is fatal to the infected person. I have submitted a full report in connection with the subject of the conditions obtaining in the Gold Coast and in the Haute Volta. I am not in the position to criticise or comment on the pathogenicity of the disease, but I beg to submit the following figures given by Dr. Wade, who made a careful study of this problem from 1910 to 1913, the following table No. I is compiled from his report to the Honourable, Director of Medical and Sanitary Service. If this information is accurate I suggest that the pathogenicity of the disease in the Northern Territories of the Gold Coast is a serious factor. Dr. Young gives a high rate of infection of human trypanosomiasis in the fly (Appendix to Dr. Young's Report dated the 2nd January, 1925.) We have not found such a similar high rate at Yeji or Makongo, and I suggest that this variability needs a further study.

31. I have every reason to believe that the French Authorities consider human trypanosomiasis on the West Coast of Africa, to be worthy of a fuller investigation.

32. From an economic point of view the measures to control tsetse at Makongo, present unique features and I consider that these can be carried out in a practical manner. After careful study the Assistant Entomologist and myself have found that the infested area at Makongo is due to the incidence of G. tachinoides and G. palpalis, along the river and small streams. The terrain surrounding Makongo is open and free of tsetse, by careful and systematic clearing the essential infested area should be completely controlled at a reasonable cost.

Clearing Experiments on the Cattle Route.

33. Experiments are now being undertaking to clear the necessary vegetation at the infested points on the cattle route, and the results will be most carefully noted by Mr. Morris, the Assistant Entomologist, with regard to climatic conditions and possible reinfestation.

Recommendations for Future Work.

34. The question of direct transmission by other insects is a point which certainly needs a further investigation. It has been found that Hippoboscid infestation is very heavy, and appears to be greater than elsewhere.

35. The relation of the flora to the incidence of the fly should most certainly be further studied, as I suggest that this factor combined with game distribution and climatic effects may provide the clue to the disappearance of G. morsitans from certain areas.

36. The results of the clearing experiment can hardly be estimated in one season's work, and the problem of the adaptability of the fly to changed environment and also the re-growth of the vegetation must be studied further.

37. Other factors which time has prevented from being studied, such as the parasitism, and control by birds, should not be overlooked. I most heartily agree with the recommendations of the Pathologist that the interesting subjects which he mentions should be carried to a further conclusion, and in fact in view of the knowledge we have gained, urge that Government might lose much valuable and practical information if these particular projects were prematurely abandoned at this stage.

38. Dr. Robinson and myself wish to express our appreciation of the work done by Mr. F. W. Abbott, Laboratory Assistant, and the African Laboratory Attendants, L. P. Gray, J. S. Nettey, A. S. Williams and D. B. Venkumuni. Both the European and native Staff live under very trying conditions and it is very gratifying to find that Africans from the Colony could so willingly adapt themselves to the privations of trekking and bush life in the Northern Territories.

39. I wish also to express my thanks to the Sanitary Department for taking blood smears at Kumasi and to the Veterinary Department for their similar co-operation at Bawku. Of the Political Officers, who gave their assistance, the work of Captain Ardron and Mr. Syme has been specially valuable.

A. W. J. POMEROY,
Medical Entomologist.

TABLE I.

TABLE SHOWING STATISTICS OF HUMAN TRYPANOSOMIASIS BY DR. W. M. WADE, M.O.S.S.

Year.	No. of Cases.	Died.	Lived.	Record Lost.	Treated.	Not Treated.	Not Recovered.
1910	98	66	18	3	17*	81	11
1911–1912 ..	73	11	9	10	11*	21	11

*Treated with Atoxyl.

II. REPORT BY DR. ROBINSON.

1. The following is a resumé of some of the work done by the Investigation during 1928 and the first month of 1929. Figures have been obtained showing the trypanosome infections of tsetse flies and cattle, and these results will be discussed later. Experiments were conducted in order to determine the incubation period of the various trypanosomes in different animals.

2. From the results obtained from examination of hump-backed cattle at the quarantine stations, Yeji, and Kumasi, it is evident that most of the infection is contracted after the cattle have left the quarantine stations.

3. The great majority of the flies examined were caught on, or adjacent to the cattle route, a vicious circle therefore exists, the cattle infecting the flies, and the flies infecting the cattle.

4. Human trypanosomiasis was investigated on a small scale at Makongo and Tunga.

5. *Trypanosomiasis of cattle.*—It has been known for some time that the great majority of the hump-backed cattle exported from French Territory are infected with trypanosomes by the time they reach their various destinations in the Gold Coast.

6. During the year an attempt was made to try and determine whether these infections were chronic infections which had been lying dormant, when it would have been difficult to demonstrate trypanosomes even in centrifuged blood, and had become acute when the resistance of the cattle had been reduced by overdriving, or whether they had been contracted while the cattle were being driven down the cattle road. With this object in view, cattle were examined at the border quarantine stations, Yeji, and Kumasi and the figures obtained are shown in Table III.

7. Thin films of the peripheral blood (obtained by puncture of the ear) were examined. There is no doubt that the infection rates at the three places would have been somewhat higher if centrifuged blood, wet preparations, or thick films had been examined—in one case, the centrifuged blood of 432 cattle was examined and trypanosomes demonstrated in 1.6% of the cattle, while no trypanosomes were found by examination of thin films—but, as the examination of the Kumasi smears, and of some of those taken at the quarantine station, was carried out at Yeji, it was impossible to employ the first two methods.

8. The table is therefore useful as showing the ratio between the infection rates, rather than the actual infection rates at the three localities.

9. The cattle examined took an average of 25 days to reach the quarantine station from their starting place in French Territory, they remained in quarantine for nine days and then took an average of 12 days to reach Yeji, and another nine days to reach Kumasi. They were therefore travelling for an average of 21 days after they left the quarantine station, before they reached Kumasi. The great majority of the cattle were emaciated and exhausted by the time they arrived at Yeji, and, if a large percentage of these animals was suffering from chronic trypanosome infection, one would have expected most of these infections to have become acute by this time, but it was only during the wet months of August, September, October, and November, that the infection rate at Yeji become raised to any extent, and during these months the flies were more numerous and the percentage of mature infections was raised.

10. The more likely and logical explanation of the increased infection at Yeji, is that this increase is due to new infections contracted within a few days of leaving the quarantine station, the increase at Kumasi being due to new infections contracted anywhere between the quarantine station and Yeji. Mature infections have been found in flies at six places on the cattle road between the quarantine station and Yeji; these flies become infected by feeding on the cattle, and then infect cattle passing down the road at a later date. During the rains, when the flies are more numerous, more flies become infected, and the infection rate in cattle at Yeji and Kumasi is raised accordingly.

11. It was thought that, if cattle were marked at the quarantine station and records of the infections kept, useful information might be obtained by re-examination of these cattle at Yeji and Kumasi. Over 1,000 cattle were marked at the quarantine station with metal ear tabs bearing a number. 755 of these were re-examined at Yeji, but, unfortunately only 22 were found at Kumasi or elsewhere.

12. Of these 755 cattle, 97 were found to be infected at the quarantine station, and 258 at Yeji, but 53 of the 97 showed no trypanosomes at Yeji, there is no doubt that trypanosomes would have been demonstrated in some of these, if centrifuged blood had been examined. Of the 22 cattle examined at all three places, seven were infected at the quarantine station, 12 at Yeji, and 17 at Kumasi. Two of the seven were negative at Yeji, but trypanosomes were demonstrated in these at Kumasi. Two of the 12 were negative on subsequent examination at Kumasi.

13. *The pathogenicity of the various trypanosomes for cattle.*—It is impossible to draw any definite conclusions as to the pathogenicity of the various trypanosomes encountered, for the cattle examined during the year. The cattle were on the move the whole time and it was not possible to follow the course of events in infected animals.

14. Most of the animals were emaciated and exhausted by the time they reached Yeji, and, in view of the fact that the infection rate at this place remained low except during the wet months, other factors, such as overdriving and lack of suitable food, had probably much to do with their condition.

15. The blood of the majority of the animals showed varying degrees of anaemia. Three non-humped cattle were kindly supplied by the P.V.O. and these were used in experiments to determine the pathogenicity of the various trypanosomes.

16. *Bullock* 1.—This animal was infected with *T. vivax* by feeding wild flies. Trypanosomes first appeared in the peripheral blood on 17/9/28 after an incubation period of ten days. They multiplied rapidly and became very numerous, until 30/9/28, when they began to diminish in number until the blood was negative on 17/10/28. The blood remained negative until 25/10/28, when scanty trypanosomes were present. They again multiplied rapidly until they were very numerous on 8/11/28. They then diminished in number until the blood became negative again on 16/11/28. The blood has remained negative since. This animal is still in good condition five months after T. vivax first appeared in the peripheral blood.

17. *Bullock* 2.—This animal was infected with T. brucei by subcutaneous inoculation of 1.5 cc of the blood of a rat. This strain was obtained from a Zebu bullock and had been maintained in a sheep.

T. brucei first appeared in the peripheral blood on 22/10/28, after an incubation period of six days. On this date trypanosomes were numerous, and one postero-nucleated form was seen. They became scanty on 24/10/28, and remained scanty until 8/11/28, when the blood was negative. A rat inoculated on this date showed T. brucei in the peripheral blood seven days later; this rat lived for 37 days. The blood remained negative until 16/11/28, when trypanosomes were again present in scanty numbers, but became negative again on 19/11/28, and remained negative. Inoculation of a rat with 1.5 cc of blood, on 16/1/29 produced no infection.

This animal fed two vivax infected flies on 1/1/29 and showed T. vivax in the peripheral blood on 11/1/29. On 16/1/29, T. vivax was swarming, and the animal looked ill and would not feed. It died on 21/1/29, and on this date T. vivax was still swarming in the peripheral blood. Post-mortem examination revealed congestion of the lungs, liver, spleen and kidneys. There also appeared to be a small haemorrhage into the cortex of the kidneys, and the heart was very flabby.

This strain of T. vivax killed a sheep in 35 days.

18. *Bullock* 3.—was inoculated subcutaneously with 2 cc of the blood of a rat.

This strain was the same as was used to infect Bullock 2, but its virulence had been increased for rats.

T. brucei first appeared in the peripheral blood on 3/1/29, after an incubation period of five days. Trypanosomes remained scanty in the peripheral blood until 11/1/29, when the blood was negative. The blood remained negative until 5/2/29, when trypanosomes were again present in scanty numbers. A rat inoculated on 23/1/29, showed T. brucei in the peripheral blood six days later.

T. brucei has remained scanty in the peripheral blood of this bullock.

On 21/1/29, this bullock fed a fly which had been infected with T. vivax by feeding on Bullock 2. T. vivax appeared in the blood on 1/2/29 and remained scanty for a few days when the blood became negative and has remained negative for T. vivax since. Although T. brucei can still be demonstrated in the blood of this animal, it is still in good condition.

19. From these experiments it seems that T. vivax was not pathogenic for Bullock 1, and it is doubtful if the death of Bullock 2 was caused by trypanosomes, as it died five days after T. vivax had appeared in the peripheral blood, and had remained in good condition when infected with T. brucei.

Bullock 2, had apparently recovered from its infection with T. brucei, and this trypanosome lost its virulence for rats by passage through this animal, taking 37 days to kill a rat.

Rats infected with T. brucei died in two to 11 days.

Bullock 3 has not been infected long enough to deserve comment.

20. It should be noted that these cattle were non-humped, and were resting during these experiments.

Driven cattle are almost certainly more susceptible to trypanosome infection.

The Trypanosomes Encountered.

21. *Trypanosoma theileri.*—This trypanosome was only observed once in several thousand cattle examined. Prolonged search of one thin film revealed only one trypanosome.

22. *Trypanosoma tragelaphi.*—A large trypanosome measuring 72 to 80 microns in length, and seven to 10 microns in breadth, was observed

six times. From the description given in Wenyon's Protozoology, these appeared to be T. tragelaphi. The kinetoplast was nearer the nucleus, and the portion of the body posterior to the kinetoplast was longer than in T. theileri. There was only one trypanosome in each smear.

23. *Trypanosome vivax.*—All the trypanosomes of this group were called T. vivax, no attempt being made to differentiate between T. vivax, and T. caprae, and T. uniforme.

This trypanosomes accounted for the great majority of the infections met with. Swarming peripheral infections were often observed.

Several attempts were made to infect rats and guinea-pigs, but with negative result.

24. *Trypanosoma congolense.*—This trypanosome accounted for about 7% of the infections visible at Kumasi. It was also observed at Yeji, but not at the quarantine stations. Swarming peripheral infections were rarely observed.

25. *Trypanosoma brucei.*—T. brucei was observed 18 times at Kumasi and 17 times at Yeji. In the majority of these infections, the polymorphism of this trypanosome was not very noticeable, the long slender forms, and intermediate forms with a fairly long free flagellum, being most numerous. Some of the infections looked very like T.evansi, but inoculation of rats and a guinea-pig showed their true nature, postero-nucleated forms being produced in varying numbers.

26. *The incubation period in cattle.*—Since the incubation period is supposed to vary with the number of trypanosomes injected, in the following experiments, as far as possible, only one fly was used to infect each animal. One fly was fed on the animal and was then dissected, if it showed a mature infection no more flies were fed on that animal ; if it was negative another fly was fed on the animal, and so on until one infective fly had fed.

Animal used.	*The day after feeding the fly, on which trypanosomes appeared in peripheral blood.*	*Trypanosome.*	*Method of infection.*
Goat 1 ..	8th	vivax group.	Fed one infected fly.
Goat 2 ..	15th	T. congolense.	Inoculated subcutaneously with a teased up hypopharynx.
Sheep 6 ..	10th	vivax group.	Fed one infective fly.
Sheep 6 ..	11th	T. Brucei.	Inoculated subcutaneously with infective blood (3 cc).
Sheep 7 ..	9th	vivax group.	Fed one infective fly.
Sheep 9 ..	9th	vivax group.	Fed one infective fly.
Sheep 10 ..	7th	vivax group.	Fed infective flies.
Bullock 1 ..	10th	vivax group.	Fed infective flies.
Bullock 2 ..	6th	T. brucei.	Inoculated subcutaneously with rats blood (1.5 cc).

Animal used.	*The day after feeding the fly, on which Typanosomes appeared in peripheral blood.*	*Trypanosome.*	*Method of infection.*
Bullock 2 ..	10th	vivax group.	Fed one infective fly.
Bullock 3 ..	5th	T. brucei.	Inoculated subcutaneously with rats blood (2 cc).
Bullock 3 ..	11th	vivax group.	Fed two infective flies.

The incubation period in rats inoculated by the syringe varied from two to eight days, and in guinea-pigs varied from seven to twenty-three days.

Typanosome Infection of Tsetse Flies.

27. Table II shows the mature infections in G. palpalis and G. tachinoides in various localities on the Eastern cattle route.

The figures are in percentages.

The technique, employed in obtaining these figures, was that of Ll. Lloyd and W. B. Johnson, described in detail in Bull. Ent. Res. XIV part 3, 1924, except that, in making stained preparations, the organs were teased up in a drop of citrated human blood (one drop of blood and five drops of citrated saline) instead of fowl serum.

28. The two commonest flies met with were G. tachinoides and G. palpalis. G .submorsitans was found only at Suguri. Twenty-one wild flies were examined and one showed a mature T. vivax group infection.

29. G. medicorum was found only at Yeji. Thirty wild flies were examined, one showing a mature T. congolense group infection, and one had T. congolense in gut only. Two showed mature T. vivax group infections.

30. Almost all the wild flies examined were caught on, or adjacent to, the cattle road, so that the main source of infection of these flies was the cattle. When the infection rate in cattle at Yegi was high, the infection rate in flies at Makongo and Yeji was raised.

31. G. tachinoides was almost always more numerous than G. palpalis, but the difference was least marked at Makongo, where six per cent. of the population were found to harbour trypanosomes in their lymph-glands.

32. The infection rate in G. tachinoides was almost always higher than in G. palpalis, so that G. tachinoides is apparently the main cattle inhibiting fly.

33. The percentage of mature infections in the total infections was fairly high throughout the period during which these examinations were carried out, but was raised at Makongo and Yeji as the rains increased.

Development of T. Vivax Group in Tsetse Flies.

34. Laboratory-bred G. tachinoides and G. palpalis were fed on various animals, infected with T. vivax by wild flies, and the following results obtained. The proboscis only was examined.

G. TACHINOIDES. *Number of flies dissected.*	*Day dissected after first infecting feed.*	*Result.*
2	2nd	Negative.
5	3rd	Negative.
10	4th	Negative.

G. TACHINOIDES. Number of flies dissected.	*Day dissected after first infecting feed.*	*(Result).*
23	5th	One had colonies in the labrum, and infective forms in the hypopharynx. One had four single fixed crithidia in the labrum, and the hypopharynx negative.
4	6th	Negative.
14	7th	Four had colonies in the labrum, and infective forms in the hypopharynx.
4	8th	Three had colonies in the labrum, and infective forms in the hypopharynx.
10	9th	Two had colonies in the Labrum, and infective forms in the hypopharynx.
4	10th	Negative.
3	11th	Negative.
3	13th	Negative.

Thus, out of 82 flies, 10 (12.1 per cent.) showed mature infections.

The hypopharynx first became invaded on the 5th day after the first infecting feed.

The number of feeds varied from one to four (two flies).

Of the 14 flies dissected on the 7th day, four fed on a clean animal on the day of dissection. Two of these, on dissection, showed mature vivax group infections.

The animal showed T. vivax in the peripheral blood 11 days later.

C. PALPALIS. Number of flies dissected.	*Day dissected after first infecting feed.*	*Result.*
3	3rd	Two had small colonies in the labrum and the hypopharynx negative.
5	4th	One had small colonies in the labrum and the hypopharynx negative.
7	5th	One had colonies in the labrum, and infective forms in the hypopharynx.
1	6th	Negative.

G. TACHINOIDES. Number of flies dissected.	*Day dissected after first infecting feed.*	*Result.*
9	7th	One had small colonies in the labrum, and scanty infective forms in the hypopharynx. Two had small colonies in the labrum, and the hypopharynx negative.
2	9th	One had colonies in the labrum, and infective forms in the hypopharynx.
4	10th	Two had colonies in the labrum, and infective forms in the hypopharynx.
1	11th	One large colony in the labrum, and infective forms in the hypopharynx.

6 (18.7 per cent.) out of 32 flies showed mature infections.

The hypopharynx was first invaded on the 5th day after the first infecting feed. The fly which was dissected on the 11th day, fed on a clean animal on the day of dissection. This animal showed T. vivax in the peripheral blood 10 days later.

G. Medicorum.

35. Two G. medicorum fed on a sheep, showing numerous T. vivax in the peripheral blood were dissected on the 6th day after the first feed: one showed a mature vivax group infection. One fly which had fed on a rat, showing T. brucei in the peripheral blood, was dissected on the 9th day after the first feed, and showed T. brucei in the gut and proventriculus, the proboscis and salivary glands being negative.

Human Trypanosomiasis.

36. Working in conjunction with the Assistant Director of Medical and Sanitary Service, Tamale, the combined populations of Makongo and Tunga were examined for trypanosomes.

37. Wet preparations of the gland juice were examined and 6.8 per cent of the combined populations were found to harbour trypanosomes in their glands. Only those who had enlarged glands were examined, and some of these enlargements were found to be due to venereal disease and Filariasis.

38. The infected people showed no symptoms of Trypanosomiasis, the enlarged and softened glands being the only sign.

The peripheral blood was examined in two cases but was negative.

39. One of the cases died of Pneumococcal Septicaemia. Post-mortem examination revealed no evidence of trypanosome infection. This case was an excellent example of Ulcerative Endocarditis, a condition supposed to be rare in the tropics.

40. Attempts were made to isolate the strains, but no monkeys were available. Six black rats were used but attempts to infect these failed. Steps have been taken to procure monkeys and white rats and it is hoped that these strains will be isolated and their behaviour, in laboratory and domestic animals, studied. The trypanosomes encountered resembled, in their morphology, T. gambiense.

Suggestions for work at Yeji for the Year 1929–30.

1. The continuation of the examination of the cattle at Yeji and Kumasi in order to determine the result of clearing several localities on the cattle route.

2. Investigation on the pathogenicity of the various trypanosomes for cattle. It is doubtful if the trypanosomes encountered have any great pathogenicity for cattle.

A small herd could be purchased and kept at Yeji for this purpose.

3. Investigation on the cycle of T. congolense in the fly.

4. Investigation on the mechanical transmission of trypanosomes, especially by Hippoboscidae.

5. *a.* The isolation of, and observation on the behaviour of the Makongo strains of human trypanosomes in laboratory and domestic animals.

b. The transmissibility index of the human strains from Makongo.

TABLE II.

TABLE SHOWING THE MATURE INFECTIONS IN TSETSE-FLIES IN VARIOUS LOCALITIES OF THE EASTERN CATTLE ROUTE, 1928–1929.

Figures are Percentages.

Period.	Locality.	G. palpalis.					G. tachinoides.				
			Mature.					Mature.			
		Number of flies examined.	T. vivax group.	T. congolense group.	T. brucei gambiense group.	Percentage mature in total infections.	Number of flies examined.	T. vivax group.	T. congolense group.	T. Brucei gambiense group.	Percentage mature in total infections.
April and 1st week of May, 28.	Nakpandure	15	6.6	0	0	100	0	0	0	0	0
	Nagbo ..	12	0	0	0	0	0	0	0	0	0
	Jawani ..	17	0	0	0	0	0	0	0	0	0
	Suguri ..	291	2.7	0.3	0	64·3	681	2.7	0	0	47·5
July, 28.	Dokonkede	6	0	0	0	0	94	2.1	0	0	100
July, 28.	Makongo	47	0	0	2.1	50	101	5·9	3·9	0	55·5
August, 28.	,, ..	55	3·5	0	0	100	174	8.6	1·7	0	100
October, 28.	,, ..	12	8.3	0	0	100	30	10.0	0	0	100
November, 28.	,, ..	109	4·5	0.9	0	100	83	3·6	0	0	75·0
January, 29.	,, ..	80	0	0	0	0	21	0	0	0	0
Total	Makongo..	303	2.6	0.3	0.3	90	409	6.6	1.7	0	82.9
October, 28.	Tunga ..	5	0	0	0	0	27	7·4	3·7	0	100
November, 28.	,, ..	1	0	0	0	0	3	66.6	0	0	10
January, 29.	,, ..	10	0	0	0	0	32	0	0	0	0
Total	Tunga ..	16	0	0	0	0	62	6.4	1.6	0	100
June, 28.	Yeji ..	175	1·7	0	0	75·0	483	3·9	0.8	0	82.1
July, 28	,, ..	50	2.0	0	0	100	138	2.9	0·7	0	100
August, 28.	,, ..	52	7·6	0	0	100	230	14·3	4·0	0	97·5
September, 28.	,, ..	49	4·0	0	0	100	196	11·7	0·5	0	96.0
October, 28.	,, ..	64	9·6	1.5	1.5	100	297	6·7	0·3	0	100
November, 28.	,, ..	11	0	0	0	0	10	0	0	0	0
December, 28.	,, ..	24	8.3	0	0	100	121	3·3	0.8	0	83·3
January, 29.	,, ..	33	0	0	0	100	137	1·4	0	0	66.6
February, 29.	,, ..	50	0	0	0	0	280	2.1	0	0	85·7
Total	Yeji ..	508	3·7	1.9	0.19	95·4	1,892	6.0	0.6	0	90.0
August, 28.	Prang ..	25	4·0	0	0	100	91	13·1	2.1	0	82.3

TABLE III.

TABLE SHOWING THE INFECTION RATE IN CATTLE, EASTERN CATTLE ROUTE, 1928–1929.

Figures are Percentages.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Quarantine Stations Number of cattle exd. year	450 1928	550 1928	670 1928	550 1928	650 1928	565 1928	615 1928	230 1928	240 1928	455 1928	365 1928	289 1928
T. vivax ..	4.6	0.9	4.7	6.9	8.0	7.7	8.6	24.3	13.7	18.6	15.0	14.8
T. congolense	0	0	0	0	0	0	0	0	0	0	0	0
T. brucei ..	0	0	0	0	0	0	0	0	0	0	0	0
Double infections with T. vivax ..	0	0	0	0	0	0	0	0	0	0	0	0
Total infections ..	4.6	0.9	4.7	6.9	8.0	7.7	8.6	24.3	13.7	18.6	15.0	14.8
Yeji N.Ts Number of cattle exd. year	557 1929	567 1929	— —	— —	— —	1,278 1928	1,313 1928	864 1928	481 1928	583 1928	720 1928	431 1928
T. vivax ..	14.5	12.8	—	—	—	13.3	15.2	34.1	65.2	74.2	49.3	25.5
T. congolense	0	0	—	—	—	0.1	0.5	0.2	1.2	1.0	0	0.2
T. brucei ..	0	0	—	—	—	.3	0.2	0.4	0	1.0	0.1	0
Double with T. vivax ..	0	0	—	—	—	0.3	0.3	0.3	0	1.0	0.1	0.2
Total Infection ..	14.5	12.8	—	—	—	13.7	16.0	34.8	66.4	76.2	49.4	25.7
Kumasi Slaughtered Number of cattle exd. year.	173 1929	— —	— —	— —	— —	174 1928	241 1928	191 1928	219 1928	113 1928	134 1928	127 1928
T. vivax ..	58.0	—	—	—	—	48.2	61.4	61.7	59.3	63.7	73.1	58.2
T. congolense	0.7	—	—	—	—	5.1	11.6	8.3	14.1	19.5	0	0
T. brucei ..	0	—	—	—	—	1.7	0.4	1.0	1.3	0.9	0	1.6
Double with T. vivax ..	0.7	—	—	—	—	3.4	6.2	4.1	5.4	8.0	0	0.8
Total Infection ..	58.7	—	—	—	—	55.6	73.4	71.0	74.9	84.9	73.1	59.4
Kumasi Exported Number of cattle exd. year.	68 1929	—	—	—	—	—	242 1928	101 1928	76 1928	58 1928	147 1928	52 1928
T. vivax ..	55.8	—	—	—	—	—	69.8	54.4	55.2	60.3	68.0	63.4
T. congolense	0	—	—	—	—	—	5.2	6.8	2.8	17.1	6.7	0
T. brucei ..	0	—	—	—	—	—	1.2	0	0	0	0.7	0
Double with T. vivax ..	0	—	—	—	—	—	3.7	3.9	0	12.0	2.7	0
Total Infection ..	55.8	—	—	—	—	—	75.1	61.2	58.0	77.5	76.1	63.4

APPENDIX C.

THE BLOOD PARASITES OF CATTLE IN ACCRA.

During September and October 1928, a short examination of the blood parasites of cattle was carried out in order to obtain figures to compare with the results obtained by the Tsetse Trypanosomiasis investigation party from Zebu cattle at different stages of their journey from French Territory southwards.

This has been carried by several observers previously but I do not know whether the figures have been compared in cattle from different destinations, so that Nigerian Zebu cattle were included in the investigation as well as the local non-humped dwarf variety. The humped Zebu cattle that had come from French Territory had probably been a considerable time in the country and passed through many tsetse belts ; they were very thin, but not sick in the obvious sense to the casual observer.

Forty two Zebu cattle of French origin showed a 95 per cent. infection with Trypanosoma vivax while a similar breed of cattle from Northern Nigeria gave 18 per cent. infection with the same trypanosome. The local non-humped dwarf native cattle, gave only 3.3 per cent. with T. vivax.

Piroplasma infections were an interesting finding in that a much higher rate of infection was revealed than had been assumed to occur from observations made by the thin film method. Theileria was not met with at all in the blood or in the 164 spleen smears of the cattle examined.

Infections with microfilaria and spirilla similarly were observed though no decision could be obtained of their variety.

The results are made more comparative when placed in tabular form.

	French Territory Zebu.	Nigerian Zebu.	Non-humped Dwarf.
Total examined	42	94	92
Trypanosoma vivax	40	17	3
Piroplasmata	8	42	54
Microfilaria	—	2	10
Spirilla	—	2	3
Negative	2	41	35

APPENDIX D.

PLAGUE WORK.

Experiments on plague, which had been interrupted for about a year, were resumed last August. The new plague room proved very satisfactory. Animals housed in it are now completely isolated from others and owing to the increased space can be inspected much more easily than previously.

For the present work fresh cultures were obtained from Nigeria, the Lister Institute and from South Africa. For these we are indebted to Dr. Connal, Dr. Schutze and Dr. Pirie. Dr. Pirie also sent us a detailed account of the work on which he is engaged at present on the bacteriophage and bacterial variation in connection with plague. His results have been of considerable assistance and we greatly appreciate his kindness in sending them before they are published.

Our experiments are concerned mainly with the protective effect of vaccines and the factors influencing the virulence of B. pestis. As experimental animals Cricetomys gambianus was used almost exclusively and 360 of these have been used during the year.

Conditions affecting Virulence.—The experiment, mentioned in a previous report in which B. pestis was shown to undergo marked reduction in virulence on passage through an animal rendered partially immune by vaccination was successfully repeated on two occasions. Relatively avirulent cultures produced in this way were obtained from the liver of the vaccinated animal at death, presumably, that is, from the general circulation. It was further observed that a culture obtained from the abscess, which developed at the site of infection, showed no loss of virulence. A remarkable condition was thus demonstrated in which an animal harboured fully virulent organisms locally and relatively avirulent ones in the general circulation at the same time. If, however, instead of a partially immune animal, one possessing complete immunity is used the result is different. Vaccinated animals, which had survived the dose were found to be completely immune. A number of these were injected with a virulent plague strain and after a week a culture was recovered from the site of inoculation of one of them, and this culture was found to be completely avirulent. These animals of course did not develop septicaemia and therefore no culture could be obtained from the general circulation.

To explain these results it may be assumed that a virulent culture of B. pestis is transformed into an avirulent one by the action of antibodies. Vaccination does not produce sufficient antibodies to effect this transformation, but subsequent infection may give rise to sufficient antibodies to produce a partial or complete transformation in the general cirulation. But at the site of infection, virulent organisms are shut off from the general circulation by an abscess wall and are so shielded from the effect of antibodies. On the other hand in the case of completely immune animals the full complement of antibodies is present throughout the body and virulent organisms when injected are immediately acted on and lose their viruence.

Variants of B. pestis. A continued study of variation in B. pestis has not led to very definite results, although the South African strains, received from Dr. Pirie have proved more interesting in this respect than the Nigerian and Sekondi strains previousy used. Certain strains of B. pestis undoubtedly produce rough variants on long cultivation, and the difference between typical rough and typical smooth strains is striking. The change however would appear to be a gradual one and not a sudden mutation, such as is described for certain other organisms, for in the case of plague all intermediate stages may be observed. Further the relation between virulence and smoothness does not appear to be close. Our experiments indicate that, although a typically rough colony is never fully virulent, it is not necessarily completely avirulent, and on the other hand a smooth colony may be virulent or avirulent.

Protective Inoculation. As regards protective inoculation a vaccine prepared in the same way as Hindle's yellow fever vaccine has been tried. The enormous numbers of plague bacilli in the spleens of animals dying of plague and the reputed importance of a " body strain " for the preparation of vaccine gave rise to this idea. The method of preparation was to pass the spleen of an animal recently dead of plague through a small mincer, mix the pulp with 3 parts of one per cent. phenol and shake with glass beads. The results obtained with vaccine, although of interest were not good enough to warrant a practical application of the method. Considering the number of bacilli injected it was found that the spleen emulsion gave much more immunity than an agar grown vaccine, but two rather large doses (⅛ and ¼ gram of spleen pulp) did not confer complete immunity and a nodule, consisting apparently of escapsuled emulsion, usually persisted at the site of injection.

As regards immunization with living avirulent cultures, our experiments indicate that the method is impracticable. Many animals, which have survived inoculation with strains of diminished virulence, have been inoculated with strains of proved virulence and a number of them have died of plague. It seems that on cultivation the antigenic property of a strain disappears soon after virulence, and if a strain is completely avirulent it probably has no protective capacity.

A few experiments have been made with broth grown vaccine, and the results have not been better than those obtained with agar vaccines. There seems no reason therefore to abandon the usual agar vaccine, but there is some evidence that multiple doses are more effective than single ones, the total quantity administered in each case being the same. In a future epidemic therefore it may be advisable to administer, where possible, four to six doses at intervals of two or three days instead of the usual two doses.

APPENDIX E.

A Preliminary Report on Malaria in African Parturient Woman at the Maternity Hospital, Accra.

It has been frequently reported that Placental tissue harbours malaria parasites in great numbers and the present note is made as preliminary observations on an enquiry which it is hoped to follow up on the question of malaria and immunity.

The figures at present are much too few upon which to base any remarks and they are given as a matter of general interest. The observations have been carried out from September 1928 to March 1929, from material obtained from the Maternity Hospital attached to the Gold Coast Hospital, Accra.

The examination has been made by the comparative findings in blood from the finger and from placental smears, the latter being corroborated by sections made of placental tissue and the series now reported is consecutive and total 57 not all of which are in detail ; and we are extremely grateful to Dr. Summerhayes who has taken infinite pains to obtain the specimens and the history of the cases. The results are given in tabular form but briefly they reveal at present the following findings.

Out of five children naturally stillborn the placenta of only one showed parasites.

Out of eleven children naturally premature the placenta showed parasites in seven and no parasites in four.

The suggestion is thus conveyed that prematurity may be induced by a malaria laden placenta but that it does not cause stillbirths : the figures are much too few at present.

Number of case.	Parasites found in Placental smear.	Parasites found in Placental Section.	Parasites found in finger blood at same time.	Parasites found in finger blood at later date.	Prematurity.	Prenatal Albuminuria.	Complicated Labour.	Postnatal obstetric temperature.	Postnatal temperature not obstetric.	Temperature following three days routine quinine after delivery.	Notes on child.	Remarks.
1	.	—	.	.	+	.	.	.	.	.	Stillborn.	
2	+	+	.	.	—	.	—	—	+	—	Stillborn.	
3	—	—	.	.	—	.	—	—	—	—		
4	+	+	.	.	+	.	—	—	+	—		Three weeks premature.
5	.	—	.	.	+	.	.	.	.	.		Five months abortion.
6	—	—	—	.	—	+	—	—	—	—		
7	—	—	—	.	—	.	+	?	?	+	Stillborn.	Obstructed labour.
8	—	—	.	.	—	.	+	+	+	+	Stillborn.	Craniotomy.
9	—	—	+	.	—	+	—	—	—	—		Crescents maternal blood.
10	—	—	—	.	—	—	—	—	—	—		Induced by quinine.
11	—	—	—	.	—	—	—	—	—	—		
12	+	+	+	—	—	+	—	—	+	+		
13	—	—	—	.	—	.	.	.	—	—	Stillborn.	
14	—	—	.	.	.	.	.	.	.	.		Induced 34 weeks.
15	—	—	—	.	—	—	—	—	—	—		
16	—	—	—	.	—	+	—	+	—	+		
17	+	+	+	.	—	.	—	—	—	—		P.P.H.
18	.	—	.	.	.	.	.	.	.	.		Treated with quinine antenatally.
19	+	+	+	.	—	—	—	—	+	+		
20	—	—	—	.	.	.	+	.	.	.	Stillborn.	Mother ill. Enlarged Spleen.
21	—	—	—	.	—	+	—	—	—	—		
22	—	—	—	—	+	+	—	—	—	—		Anaemia of Pregnancy.
23	—	—	—	.	—	—	—	+	—	—		

Number of case.	Parasites found in Placental smear.	Parasites found in Placental Section.	Parasites found in fingerblood at same time.	Parasites found in finger blood at later date.	Prematurity.	Prenatal Albuminuria.	Complicated Labour.	Postnatal obstetric temperature.	Postnatal temperature not obstetric.	Temperature following three days routine quinine after delivery.	Notes on child.	Remarks.
24	—	—	—	·	—	·	—	—	—	—		
25	—	—	—	—	—	—	—	—	—	—		
26	+	+	+	·	+	—	—	—	—	—		
27	+	+	—	·	—	—	—	?	?	—		
28	—	—	—	·	—	+	—	—	—	—		
29	+	?	+	·	+	+	·	·	·	·		Mother died before delivery.
30	—	—	—	·	—	·	—	—	—	—		
31	—	—	—	·	—	—	+	—	—	—		
32	—	—	—	·	—	—	—	—	+	—	Stillborn.	
33	—	—	—	·	—	·	+	+	·	·		
34	—	—	—	·	—	·	—	—	—	—		
35	+	+	+	·	—	—	—	—	+	+		
36	+	+	—	·	+	·	+	—	—	—	—	
37	+	+	—	·	—	·	+	—	—	+		
38	+	+	+	·	+	·	—	—	+	+		
39	—	—	—	—	—	—	—	?	?	—	Stillborn.	
40	—	—	—	·	·	—	—	—	—	—		
41	—	—	—	·	+	+	—	—	+	—		
42	+	+	+	·	—	·	+	—	—	—	Craniotomy.	
43	+	+	+	·	+	+	—	—	—	—		
44	+	+	+	·	+	·	—	+	?	?		
45	—	—	—	·	—	—	—	—	—	—		
46	—	—	—	—	—	—	—	—	+	—		
47	+	+	+	·	—	·	+	+	—	—	Craniotomy.	
48	—	—	—	·	—	·	—	—	+	—		
49	—	—	—	·	—	—	—	—	—	—		
50	—	—	—	·	—	·	·	·	·	·		
51	—	—	—	·	—	·	+	+	—	—		
52	—	—	—	—	+	·	—	—	+	—		
53	—	—	—	·	·	·	·	·	·	·		Ruptured Uterus.
54	+	+	—	·	+	·	—	—	—	—		
55	—	—	—	·	—	—	—	—	—	—		
56	—	—	—	·	—	—	—	—	—	—		
57	—	—	—	·	—	—	—	—	—	—		

APPENDIX F.

Some experiments with Hookworm Larvae.

1. At my suggestion Dr. Russell undertook some experiments with hookworm larvae as a preliminary observation on the possibility of a local immunity against infection with that helminth. Dr. Russell's observations are as follows.

2. Fifty specimens of human faeces containing hookworm ova or hookworm ova and strongyloides larvae were cultivated by placing the specimens on fine cotton in a glass funnel. One inch of rubber tubing was attached to the stem of the funnel and closed with a clip. The stem was filled with water until the level just touched the cotton. Each day the clips were loosened and a few drops of fluid were removed and examined for larvae and the P.H. reading noted. The water in the stem was replenished each day with tap water.

3. In the fifty specimens under observation, all showed hookworm ova but in 15 strongyloides larvae were also present on cultivation by the above method.

41 developed hookworm larvae.
31 developed adult strongyloides.
6 failed to develop.

4. The reaction of the drops removed for examination was taken with the B.D.H. universal indicator and usually the specimens were found to be acid or neutral for the first day or two but subsequently became alkaline.

5. The best cultures were obtained from specimens which were alkaline from the onset or rapidly became so.

Four out of the six cultures that failed to hatch out registered a P.H. of five or higher acidity for at least six days.

6. The laboratory tap water with which the experiments were carried out registered a P.H. of eight to 8.5 with the same indicator.

7. Owing to supposed possible confusion between hookworm ova in a stage of advanced segmentation and strongyloides ova and owing to the frequency of the former in specimens sent to the laboratory it was decided to test out this point.

8. Twenty-two specimens of ova in an advanced stage of segmentation were isolated in hollow ground slides and their development watched. Hookworm larvae alone developed.

9. The possibility of local skin immunity against hookworm infection was tested in guinea pigs, but the results are too incomplete for inclusion.

G. G. BUTLER,

Director, Medical Research Institute.

IX.—SCIENTIFIC.

(*b*) ANNUAL REPORT OF THE ANALYTICAL CHEMIST.

The number of samples dealt with was 1,055 and comprised the following :—

Examinations for poisons.		
Human viscera	7	
Stomach and intestine contents	7	
Native medicines	4	
Drugs	9	
Food	1	
Paint	3	
Water	2	
		33
Medical and Sanitary Service.		
Waters	10	
Disinfectants	2	
Foods and Beverages	7	
		19
Customs Department.		
Whisky	18	
Brandy	32	
Gin and Geneva	44	
Rum	94	
Beer and Stout	59	
Wine	102	
Medicated wine	25	
Liqueur	15	
Vermouth	16	
Essences	7	
Methylated spirit	12	
Perfumery	286	
Essential oil	24	
Fixed oil	13	
Polish	7	
Patent medicine	94	
Sweetened condensed milk	42	
Unsweetened condensed milk	29	
Miscellaneous	22	
		941
Department of Agriculture.		
Well water	52	
		52
Other Departments.		
Miscellaneous	10	
		10
Total		1,055

The analyses of human organs and stomach contents were made in connection with six deaths from suspected poisoning.

The exhibits in a case of death by suicide consisted of a solution of Metol (photographic developer) and a broken bottle of crystals of that substance. The stomach washings contained sulphate ion and fragments of amber coloured glass similar to that of the bottle and had a peculiar odour suggestive of petroleum. Metol was not detected in the stomach washings and no metallic ion was present.

It appeared probable that deceased had swallowed Metol (a sulphate) either in solution or in crystal form. No record has been found of a previous case of metol causing death when taken internally.

In a fatal case of poisoning by oxalic acid 1.68 grammes of the acid were recovered from the contents of the stomach and 0·66 gramme from a portion of the intestine.

A bottle, the contents of which were consumed with fatal results, contained a few drops of liquid which proved to be compound liniment of aconite.

In a fatal case of poisoning by corrosive sublimate 0.034 gramme, was recovered from the stomach and small intestine contents which also yielded methylene blue.

An alleged (native) poison, "Sinidari", from the Northern Territories and originally brought from Mecca consisted entirely of the fibrous sublimed form of ammonium chloride.

Other native medicines and alleged poisons were found to be innocuous.

A sample of paint scrapings from the roof of a bungalow in Ashanti contained 0.5 per cent. of Arsenic (calculated as Arsenious oxide) equivalent to 35 grains per pound. The water supply derived from this roof contained 0.0014 grain Arsenic per gallon.

The occupants of this bunalow for some time had been suffering from gastric derangement.

Two samples of Red Oxide powder intended to be used for painting purposes contained one per cent. and 0.01 per cent. Arsenic respectively. The former sample was considered dangerous and unsuitable for use in painting roofs of bungalows.

The police from time to time have submitted samples of gin obtained from retail vendors for the purpose of ascertaining whether the spirits had been adulterated with water. In some instances the gins were found to be of half the alcoholic strength of samples of the same brands submitted by the Customs Department.

As there is no legislation here, such as a Food and Drugs Ordinance, defining the statutory minimum alcoholic strength for various spirits, apparently no legal action could be taken.

The number of samples examined for the Customs Department continues to increase annually especially in regard to potable spirits. Considerable data respecting them has now been acquired enabling an appreciation to be made of the character and quality of all kinds of Spirits imported into the Colony.

Mr. R. Simmons was absent on leave for five months during 1928 and Mr. R. W. Clarke proceeded on leave during February of this year.

Mr. B. K. Collison was appointed as an additional Laboratory Attendant in May, 1928.

ROBT. SIMMONS, F.I.C.,
Analytical Chemist.

W. D. INNESS,
Director, Medical and Sanitary Service.
1st April, 1929.

RETURNS.

TABLE I.—MEDICAL, SANITATION AND MEDICAL RESEARCH INSTITUTE STAFF.

1	Director of Medical and Sanitary Service.
1	Deputy Director of Medical and Sanitary Service.
1	Deputy Director of Sanitary Service.
1	Director of Medical Research Institute.
2	Assistant Directors of Medical Service.
1	Assistant Director of Sanitary Service.
3	Specialists (2 Surgical and 1 Medical).
2	Senior Sanitary Officers.
5	Senior Medical Officers.
4	Pathologists.
1	Medical Entomologist.
1	Assistant Entomologist.
59	Medical Officers (14 of whom are Medical Officers of Health).
1	Medical Secretary, Gold Coast Branch, British Empire Leprosy Relief Association.
1	Woman Medical Officer.
5	Women Medical Officers (Infant Clinic).
3	African Medical Officers.
1	Junior African Medical Officer.
1	Secretary to Director of Medical and Sanitary Service.
1	Radiographer.
1	Assistant Radiographer.
2	Dental Surgeons.
2	Analytical Chemists.
1	Dispensers' Instructor.
1	Medical Storekeeper.
1	Secretary, Gold Coast Hospital.
1	Senior Superintending Sanitary Inspector.

22 Superintending Sanitary Inspectors.

1 Laboratory Superintendent.

2 Laboratory Assistants.

Vacancies :—

1 Senior Medical Officer.

1 Medical Officer.

4 Medical Officers of Health.

2 Women Medical Officers (Infant Clinic).

3 Superintending Sanitary Inspectors.

EUROPEAN NURSING STAFF.

1 Matron.

3 Senior Nursing Sisters.

28 Nursing Sisters.

Vacancies :—

2 Nursing Sisters.

PRINCIPAL MEMBERS OF THE SUBORDINATE STAFF OF :—

Medical Branch.

2 Chief Dispensers.

6 First Division Dispensers.

5 First Division Nurses.

1 Chief Clerk.

1 First Division Clerk.

Sanitation Branch.

1 Chief Clerk.

2 First Division Clerks.

1 Sanitary Inspector and Training Officer.

2 Senior Division Sanitary Inspectors.

6 First Division Sanitary Inspectors.

1 Disinfector Mechanic.

Medical Research Institute.

7 Laboratory Attendants.

1 Second Division Clerk.

Lunatic Asylum.

1 Chief Attendant.

1 Assistant Chief Attendant.

1 Matron.

Table showing Summary of Routine Sanitary Work Done During the Year.

1.—Names of Town.

Station.	1926–27.		1927–28.		1928–29.	
	Approximate Area.	No. of proclaimed open spaces.	Approximate Area.	No. of proclaimed open spaces.	Approximate Area.	No. of proclaimed open spaces.
Accra	8.5 Square Miles	35	8.5 Square Miles	37	8.5 Square Miles	37
Cape Coast	2.5 ,, ,,	4	2.5 ,, ,,	4	2.5 ,, ,,	4
Sekondi	3 ,, ,,	3	3 ,, ,,	4	3 ,, ,,	3
Kumasi	9 ,, ,,	—	9 ,, ,,	—	9 ,, ,,	—
Koforidua	2 ,, ,,	4	2 ,, ,,	6	2 ,, ,,	6
Winneba	—	—	—	—	1.2 ,, ,,	4

2.—Population.

Station.	1926–27.					1927–28.					1928–29.				
	Natives.		Europeans.			Natives.		Europeans.			Natives.		Europeans.		
	Males.	Females.	Males.	Females.	Total.	Males.	Females.	Males.	Females.	Total.	Males.	Females.	Males.	Females.	Total.
Accra	49,780†		493	78	50,351	57,629*		459	101	58,189	61,446*		438	111	61,995
Cape Coast	15,053†		58	24	15,135	17,782*		68	30	17,880	18,281*		51	25	18,357
Sekondi	12,951†		296	46	13,293	9,744*		296	46	10,086	9,783*		208	49	10,040
Kumasi	25,000†		419	35	25,454	27,332*		282	29	27,643	27,965*		264	32	28,261
Koforidua	5,363†		54	6	5,423	6,556*		54	6	6,616	6,769*		64	15	6,848
Winneba	6,980†		—	—	6,980	7,801*		—	—	7,801	7,941*		58	9	8,008

* Logarithmic calculation.

† House to house census by untrained staff.

3.—HOUSING.

Station.	1926–27.				1927–28.				1928–29.			
	Houses.		Huts.		Houses.		Huts.		Houses.		Huts.	
	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.
Accra	275	3,451	—	—	334	5,227	—	—	350	6,842	—	—
Cape Coast	24	1,554	—	156	24	1,454	—	248	25	1,444	—	—
Sekondi	162	1,352	—	—	190	1,712	—	—	190	1,712	—	—
Kumasi	160	1,334	—	—	240	1,602	—	—	214	1,780	—	—
Koforidua	34	972	—	6	40	1,214	—	See houses	44	1,242	—	—
Winneba	—	—	—	—	—	—	—	—	34	453	—	78

4.—ERECTION OF NEW BUILDINGS.

Station.	1926–27.		1927–28.		1928–29.	
	No. of Houses built without sanction.	No. of Huts built without sanction.	No. of Houses built without sanction.	No. of Huts built without sanction.	No. of Houses built without sanction.	No. of Huts built without sanction.
Accra	—	918	—	512	—	185
Cape Coast	—	—	—	—	17	—
Sekondi	4	—	—	8	—	—
Kumasi	—	—	—	—	14	—
Koforidua	—	—	—	16	2	—

4—(*b*) ACTION TAKEN.

Station.	1926–27.		1927–28.		1928–29.	
	Number of Prosecutions.		Number of Prosecutions.		Number of Prosecutions.	
	Huts.	Houses.	Huts.	Houses.	Huts.	Houses.
Accra	—	—	—	—	—	—
Cape Coast	—	—	—	—	—	—
Sekondi	—	—	1	—	—	—
Kumasi	—	—	—	—	—	—
Koforidua	—	—	16	—	14	—
Winneba	—	—	—	—	—	—

5—(*a*) LATRINES (PUBLIC).

Station	1926–27.								1927–28.								1928–29.							
	Number.				New Ones.				Number.				New Ones.				Number.				New Ones.			
	Males.		Females.		Males.		Females.		Males.		Females.		Males.		Females.		Males.		Females.		Males.		Females.	
	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.
Accra	59	617	51	373	3	30	3	30	60	618	54	374	1	10	1	10	61	634	56	379	2	10	2	10
Cape Coast ..	18	120	17	132	3	8	2	8	18	120	17	132	—	—	—	—	19	130	18	142	1	10	1	10
Sekondi	27	182	21	150	7	32	7	32	27	184	21	146	—	—	—	—	27	190	21	152	—	—	—	—
Kumasi	32	412	31	345	1	8	2	16	31	398	30	331	6	48	8	64	35	426	37	385	8	75	7	60
Koforidua ..	11	63	10	57	2	10	2	10	13	82	9	68	3	10	2	10	17	106	14	80	3	15	4	20
Winneba	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	62	15	79	1	8	1	8

5.—(*b*) LATRINES (PRIVATE).

Station.	1926–27.								1927–28.								1928–29.							
	No.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of nightsoil men.	Cesspools.	Cesspools cleansed.	New Cesspools.	Cesspools abolished.	No.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of nightsoil men.	Cesspools.	Cesspools cleansed.	New cesspools.	Cesspools abolished.	No.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of nightsoil men.	Cesspools.	Cesspools cleansed.	New Cesspools.	Cesspools abolished.
Accra	939	838	1,929	145	—	—	—	—	1,040	915	2,032	127	—	—	—	—	1,058	932	2,066	131	—	—	—	—
Cape Coast ..	225	489	262	25	—	—	—	—	149	507	—	25	—	—	—	—	192	690	59	25	—	—	—	—
Sekondi.. ..	523	580	859	77	—	—	—	—	281	570	356	62	—	—	—	—	599	549	549	62	—	—	—	—
Kumasi ..	440	1,197	1,197	89	—	—	—	—	490	980	1,980	100	—	—	—	—	623	1,511	1,511	126	—	—	—	—
Koforidua ..	80	250	60	15	—	—	—	—	215	356	528	16	2	2	1	—	273	580	—.	17	1	—	—	2
Winneba ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	69	226	226	23	—	—	—	—

6.—REMOVAL OF REFUSE

Station.	1926–27.						1927–28.						1928–29.					
	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from streets.	Carts removing refuse from yards and premises.	Amount of refuse from yards and premises.	Men employed.	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from streets.	Carts removing refuse from yards and premises.	Amount of refuse from yards and premises.	Men employed.	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from streets.	Carts removing refuse from yards and premises.	Amount of refuse from yards and premises.	Men employed.
Accra	47	7 lorries.	45 lorry loads.	3	40 cart-loads.	45	47	7 lorries	65 lorry loads.	3	50 cart-loads.		47	9 lorries.	70 lorry-loads.	—	50	35
Cape Coast..	34	4 lorries and 1 cart.	62.7 lorry and cart-loads.	—	2 cart-loads.	13	34	3 carts. 3 lorries	54 cart and lorry loads.	—	2 cart-loads.	13	34	1 cart and 4 lorries.	38 cart and lorry loads.	—	2 cart loads.	13
Sekondi	29	3 lorries.	25 lorry loads.	—	included in previous column.	54	29	3 lorries	253 head loads.	10	249 head-loads.	58	28	—	263 head-loads.	—	83 head loads.	52
Kumasi	38 and 48 Incinerators.	1	3,505 cart-loads. and head loads.	—	66 cart-loads and 352 baskets.	—	42 and 61 Incinerators.	—	3,941 head-loads.	—	123 cart-loads. 1,621 baskets.	4	44 and 61 Incinerators.	—	4,043 head-loads.	1 and 4 baskets.	128 cart loads and 1935 wheel-barrows.	4
Koforidua	7	4	25 cart-loads.	—	10	12	8	3 carts and 1 lorry	20 lorry loads and 12 cart loads.	—	—	11	10	2	13 lorry loads, 31 cart-loads, 374 head-loads.	2	20 lorry loads, 12 carts.	27
Winneba	—	—	—	—	—	—	—	—	—	—	—	—	13	6	48 cart-loads.	1	3 cart-loads.	21

7.—Mode of Disposal of Excreta, Refuse and Offal.

Station.	1926–27.												1927–28.												1928–29.											
	Buried or trenched.			Burnt.			Thrown into sea.			Otherwise dealt with.			Buried or trenched.			Burnt.			Thrown into sea.			Otherwise dealt with.			Buried or trenched.			Burnt.			Thrown into sea.			Otherwise dealt with.		
	Pails excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails excreta per day.	Cartloads refuse per day.	Cartloads offal per day.
Accra ..	—	45	6	—	—	6	838	—	—	—	—	—	—	—	—	—	—	—	915	—	5	—	62	6	—	—	—	—	—	—	932	—	6	—	70	4
Cape Coast ..	—	312	1	—	31.6	—	489	—	—	—	—	—	—	27	1/15	—	7	—	507	—	1/7	—	—	—	—	17	1/15	—	17	—	619	—	1/7	—	—	—
Sekondi ..	580	—	2	—	25	—	—	—	—	—	—	—	356	20	1	—	54	—	214	—	—	—	—	—	311	—	1	—	19	—	238	—	—	—	—	—
Kumasi ..	656	—	8	—	3923	—	—	—	—	—	—	—	728	—	7	—	5923	—	—	—	—	—	—	—	888	—	8	—	5129	—	—	—	—	—	—	—
Koforidua ..	250	—	—	—	35	11	—	—	—	—	—	—	528	22	—	—	—	—	—	—	—	—	—	—	580	31	11	—	31	—	—	—	—	—	—	—
Winneba ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	43	7	1	—	47	—	183	—	2 hlds.	—	—	—

8.—Average Daily Number of Cartloads of Cans, Bottles, and Incombustible Materials from Houses and Compounds.

Station.	1926–27.	1927–28.	1928–29.
Accra	40 cart loads	50 cart loads	50 cart loads.
Cape Coast	2 cart loads	2 cart loads	2 cart loads.
Sekondi	40 head loads	54 cart loads	88 cart loads.
Kumasi	184 cart loads	261 lorry loads	172 lorry loads and 486 head loads.
Koforidua	4 cart loads	2 lorry loads. ..	3 lorry loads.
Winneba	—	—	2 cart loads.

9.—WATER SUPPLY.

1926-27.

STATION.	Pipe-borne Water.			WELLS.				TANKS.								
				Public.		Private.		Public.		Private.		Nature of Tanks.			Barrels.	
	Source.	Public Stand-pipe.	Private Stand-pipe.	Number.	Mosquito Proof.	Number.	Mosquito Proof.	Number.	Mosquito Proof.	Number.	Mosquito Proof	Wood.	Iron.	Concrete.	Number.	Mosquito Proof.
Accra	River Densu	83	1,734	—	—	21	21	—	—	—	—	—	—	—	—	—
Cape Coast	—	—	—	10	2	194	187	11	9	161	161	9	150	62	472	434
Sekondi	Anankwan	68	209	—	—	—	—	—	—	—	—	—	—	—	—	—
Kumasi	—	—	—	30	3	113	113	—	—	221	221	—	219	2	156	156
Koforidua	Spring ..	—	—	—	—	12	12	—	—	572	572	19	499	54	1,368	1,368
1927-28.																
Accra	River Densu	85	2,141	—	—	—	—	—	—	—	—	—	—	—	—	—
Cape Coast	—	—	—	10	2	187	187	11	9	250	250	9	176	65	466	466
Sekondi	Anankwan	68	209	—	—	—	—	2	—	—	—	—	—	—	—	—
Kumasi	—	—	—	30	3	173	173	15	15	174	174	—	144	30	199	199
Koforidua	Well ..	—	—	3	1	41	38	-	—	443	443	7	42	53	341	341
1928-29.																
Accra	River Densu	85	2,192	—	—	—	—	—	—	—	—	—	—	—	—	—
Cape Coast	River ..	19	—	10	2	187	187	2	2	260	260	8	187	65	309	309
Sekondi	Anankwan	42	169	1	—	—	—	—	—	—	—	—	—	—	—	—
Kumasi	—	—	—	21	1	90	90	15	15	245	245	1	190	54	249	249
Koforidua	Spring ..	—	—	2	—	41	24	—	—	448	448	—	—	—	343	343
Winneba	River Ayensu	1 and 2 compounds	—	1	—	34	28	2	2	136	136	2	92	42	125	125

10.—DRAINAGE.

Station.	Masonry Drains.												Earth Drains.								
	1926–27.				1927–28.			1928–29.					1926–27.			1927–28.			1928–29.		
	Lineal yards.	Lineal yards reconstructed.	Lineal yards repaired.	Lineal yards constructed.	Lineal yards.	Lineal yards reconstructed.	Lineal yards repaired.	Lineal yards reconstructed.	Lineal yards.	Lineal yards reconstructed.	Lineal yards reqaired.	Lineal yards constructed.	Lineal yards cleaned.	Lineal yards dug.	Frequency of cleaning.	Lineal yards cleaned.	Lineal yards dug.	Frequency of cleaning.	Lineal yards cleaned.	Lineal yards dug.	Frequency of cleaning.
Accra.. ..	83,820	1,798	586	5,474	7,858	—	120	13,426	12,714	2,484	800	9,430	34,508	25,880	Fortnightly	142,670	40,862	Weekly.	391,500	301,250	Weekly.
Cape Coast ..	30,300	80	50	1,151	31,451	100	800	566	32,017	50	614	631	2,460	—	Monthly.	3,754	Nil.	Monthly.	4,833	200	Monthly.
Sekondi ..	33,911	—	120	3,100	36,000	—	1,350	1,930	36,420	130	75	320	6,757	301	When necessary.	10,742	1,888	Monthly.	9,567	1,807	When necessary.
Kumasi ..	16,912	—	—	1,459	17,601	—	—	689	23,479	—	—	5,878	37,464	63,791	do.	156,429	67,039	When necessary.	346,691	85,064	When necessary.
Koforidua ..	6,188	—	17	3,589	9,472	778	—	3,284	12,756	—	—	9,977	2,700	300	Every ten days.	8,220	2,055	Every three weeks.	15,912	9,394	Every 18 days.
Winneba ..	—	—	—	—	—	—	—	—	12,442	—	200	1,572	—	—	—	—	—	—	5,164	800	When necessary.

II.—INSPECTIONS AND PROSECUTIONS.

Station.	1926–27.								1927–28.								1928–29.							
	Inspectors employed.	Houses inspected.	Houses where larvæ were found.	Notices against larvæ.	Persons fined for larvæ.	Notices *re* insanitary conditions.	Persons fined for insanitary conditions.	No. of aerated and Soda water factories inspected.	Inspectors employed.	Houses inspected.	Houses where larvæ were found.	Notices against larvæ.	Persons fined for larvæ.	Notices *re* insanitary conditions.	Persons fined for insanitary conditions.	No. of aerated and Soda water factories inspected.	Inspectors employed.	Houses inspected.	Houses where larvae were found.	Notices against larvae.	Persons fined for larvae.	Notices *re* insanitary conditions.	Persons fined for insanitary conditions.	No. of aerated and Soda water factories inspected.
Accra	20	132,491	838	106	689	2,405	1,983	5	20	44,834	970	504	897	3,784	2,447	4	24	168,405	1,202	145	637	3,860	2,909	6
Cape Coast ..	12	64,630	483	196	417	382	453	—	12	47,285	414	483	413	290	294	—	12	54,251	539	407	303	2,976	210	—
Sekondi	13	55,021	176	113	135	1,480	669	2	15	57,347	336	100	225	906	584	1	12	48,530	272	35	190	617	407	2
Kumasi	19	96,547	263	203	197	3,769	3,603	1	17	61,450	570	280	505	1,753	2,561	1	17	61,850	895	304	558	1,177	2,964	1
Koforidua ..	3	28,683	538	160	527	235	251	—	3	44,317	307	294	333	653	20	—	3	39,545	254	489	219	665	22	—
Winneba	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	9,773	59	31	59	291	111	—

TABLE III.

Accurate return of statistics of population for the year cannot be given as the birth and death registration districts cover but a small portion of the Colony and its dependencies.

TABLE V.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1928–29.

Diseases.	*Remaining in Hospital at 31st March, 1927–28.*	*Yearly Total.*		*Total Cases Treated.*	*Remaining in Hospital at 31st March, 1928–29.*	*Remarks.*
		New Cases.	*Deaths.*			
I.—*Epidemic, Endemic, and Infectious Diseases.*						
1. ENTERIC GROUP—						
(*a*) Typhoid Fever ..	—	35	6	35	2	
(*b*) Paratyphoid A ..	—	6	—	6	—	
(*c*) Paratyphoid B ..	—	2	—	2	—	
(*d*) Type not defined ..	—	2	—	2	—	
2. Typhus	—	—	—	—	—	
3. Relapsing Fever	—	10	2	10	—	
4. Undulant Fever	—	—	—	—	—	
5. MALARIA—						
(*a*) Tertian	10	257	6	267	6	
(*b*) Quartan	1	58	3	59	1	
(*c*) Aestivo-autumnal ..	5	516	17	521	5	
(*d*) Cachexia	—	26	—	26	—	
(*e*) Blackwater	—	8	4	8	1	
(*f*) Unclassified	4	136	5	140	8	
6. SMALLPOX—						
Alastrim	—	—	—	—	—	
7. Measles	—	7	-	7	—	
8. Scarlet Fever	—	—	—	—	—	
9. Whooping Cough	—	6	1	6	—	
10. Diphtheria	—	—	—	—	—	
11. Influenza	1	145	5	146	2	
12. Miliary Fever	—	—	—	—	—	
13. Mumps	—	4	—	4	1	
14. Cholera	—	—	—	—	—	
15. Epidemic diarrhoea	—	—	—	—	—	
16. DYSENTERY—						
(*a*) Amœbic	2	196	32	198	6	
(*b*) Bacillary	—	102	12	102	6	
(*c*) Undefined or due to other causes	3	87	3	90	1	
17. PLAGUE—						
(*a*) Bubonic	—	—	—	—	—	
(*b*) Pneumonic	—	—	—	—	—	
(*c*) Septicaemic	—	—	—	—	—	
(*d*) Undefined	—	—	—	—	—	
18. Yellow Fever	—	2	2	2	—	
19. pirochaetosis icterohaemorrhagica ..	—	—	—	—	—	
20. Leprosy	—	19	1	19	1	
21. Erysipelas	—	—	—	—	—	
22. Acute Poliomyelitis	—	4	—	4	—	
23. Encephalitis Lethargica ..	—	2	—	2	—	
24. Epidemic Cerebro-spinal Fever	—	2	2	2	—	
25. OTHER EPIDEMIC DISEASES—						
(*a*) Rubeola (German Measles)	—	—	—	—	—	
(*b*) Varicella (Chicken-pox)	6	250	—	256	11	
(*c*) Kala-azar	—	—	—	—	—	
(*d*) Phlebotomus Fever ..	—	—	—	—	—	
(*e*) Dengue	—	7	—	7	1	
(*f*) Epidemic Dropsy ..	—	—	—	—	—	
(*g*) Yaws	16	250	6	266	18	
(*h*) Trypanosomiasis ..	—	28	13	28	4	
26. Glanders	—	—	—	—	—	
27. Anthrax	—	—	—	—	—	
28. Rabies	—	—	—	—	—	
29. Tetanus	2	19	11	21	1	
30. Mycosis	—	1	—	1	—	

Diseases.	*Remaining in Hospital at 31st March,* 1927–28.	*Yearly Total.*		*Total Cases Treated.*	*Remaining in Hospital at 31st March,* 1928–29.	*Remarks.*
		New Cases.	*Deaths.*			
I.—*Epidemic, Endemic and Infectious Diseases.—contd.*						
31. Tuberculosis, Pulmonary and Laryngeal	12	237	114	249	23	
32. Tuberculosis of the Meninges or Central Nervous System ..	1	5	4	6	—	
33. Tuberculosis of the Intestines or Peritoneum	—	7	4	7	—	
34. Tuberculosis of the Vertebral Column	3	18	3	21	6	
35. Tuberculosis of Bones and Joints	2	14	—	16	4	
36. Tuberculosis of other organs,	—	6	—	6	1	
(*a*) Skin or Subcutaneous Tissue (Lupus) ..	—	1	—	1	—	
(*b*) Bones	—	5	1	5	1	
(*c*) Lymphatic System ..	—	17	—	17	2	
(*d*) Genito-urinary ..	—	—	—	—	—	
(*e*) Other organs	—	—	—	—	—	
37. Tuberculosis disseminated—						
(*a*) Acute	—	6	5	6	—	
(*b*) Chronic	—	3	1	3	1	
38. Syphilis—						
(*a*) Primary	5	42	—	47	4	
(*b*) Secondary	2	76	6	78	9	
(*c*) Tertiary	1	71	3	72	1	
(*d*) Hereditary	—	9	3	9	—	
(*e*) Period not indicated..	—	5	—	5	—	
39. Soft Chancre	3	72	—	75	2	
40. A.—Gonorrhoea and its complications	13	221	1	234	15	
B.—Gonorrhoeal Ophthalmia ..	1	16	—	17	1	
C.—Gonorrhoeal Arthritis ..	1	67	4	68	5	
D.—Granuloma Venereum ..	2	6	—	8	—	
41. Septicæmia	—	22	9	22	1	
42. Other Infectious Diseases—Trypanosomiasis ..	2	23	5	25	2	
II.—*General Diseases not mentioned above*						
43. Cancer or other malignant Tumours of the Buccal Cavity ..	—	1	—	1	—	
44. Cancer or other malignant Tumours of the Stomach or Liver	—	5	2	5	1	
45 Cancer or other malignant Tumours of the Peritoneum, Intestines, Rectum	1	7	2	8	1	
46. Cancer or other malignant Tumours of the Female Genital Organs	—	2	—	2	—	
47. Cancer or other malignant Tumours of the Breast	1	1	—	2	—	
48. Cancer or other malignant Tumours of the Skin	—	7	—	7	—	
49. Cancer or other malignant Tumours of Organs not specified	—	21	1	21	1	
50. Tumours non-Malignant.. ..	6	66	3	72	5	
51. Acute Rheumatism	—	—	—	—	—	
52. Chronic Rheumatism	6	204	9	210	7	
53. Scurvy (including Barlow's Disease)	—	2	1	2	—	
54. Pellagra	—	—	—	—	—	
55. Beri-Beri	1	12	2	13	1	
55*a*. Avitaminosis	—	1	—	1	—	
56. Rickets	1	—	—	1	—	
57. Diabetes (not including Insipidus)	—	8	2	8	—	
58. Anæmia,						
(*a*) Pernicious	—	9	1	9	1	
(*b*) Other Anæmias and Chlorosis	1	20	1	21	2	
59. Diseases of the Pituitary Body ..	—	—	—	—	—	
60. Diseases of the Thyroid Gland—						
(*a*) Exophthalmic Goitre	—	1	—	1	—	
(*b*) Other diseases of the Thyroid Gland, Myxœdema	—	8	1	8	1	
61. Diseases of the Para-Thyroid Glands	—	—	—	—	—	
62. Diseases of the Thymus ..	—	—	—	—	—	
63. Diseases of the Supra-Renal Glands	1	—	—	1	—	

Diseases.	*Remaining in Hospital at 31st March, 1927–28.*	*Yearly Total.*		*Total Cases Treated.*	*Remaining in Hospital at 31st March, 1928–29.*	*Remarks.*
		New Cases.	*Deaths.*			
II.—*General Diseases not mentioned above* (*contd.*)						
64. Diseases of the Spleen	2	3	—	5	—	
65. Leukæmia—						
(*a*) Leukæmia	—	3	1	3	—	
(*b*) Hodgkin's Disease	—	2	1	2	—	
66. Alcoholism	—	13	1	13	—	
67. Chronic poisoning by mineral substances (lead, mercury, etc.)	—	1	—	1	—	
68. Chronic poisoning by organic substances (Morphia, Cocaine, etc.)	—	1	—	1	—	
69. Other General Diseases—						
Auto-intoxication	1	1	—	2	—	
Purpura Hæmorrhagica	—	—	—	—	—	
Hæmophilia	—	—	—	—	—	
Diabetes Insipidus	—	—	—	—	—	
69*a*. Pyrexia of unknown origin	—	43	1	43	3	
69*b*. Cases not diagnosed	—	10	—	10	—	
III.—*Affections of the Nervous System and Organs of the Senses.*						
70. Encephalitis (not including Encephalitis Lethargica)	—	—	—	—	—	
71. Meningitis (not including Tuberculous Meningitis or Cerebro-spinal Meningitis)	—	20	14	20	1	
72. Locomotor Ataxia	—	10	4	10	1	
73. Other affections of the Spinal Cord	—	6	—	6	3	
74. Apoplexy—						
(*a*) Hæmorrhage	1	23	9	24	—	
(*b*) Embolism	—	1	1	1	—	
(*c*) Thrombosis	—	3	—	3	—	
75. Paralysis—						
(*a*) Hemiplegia	7	25	10	32	2	
(*b*) Other Paralyses	1	21	—	22	4	
76. General Paralysis of the Insane	—	—	—	—	—	
77. Other forms of Mental Alienation	—	43	6	43	—	
78. Epilepsy	—	29	7	29	6	
79. Eclampsia, Convulsions (non-puerperal) 5 years or over	—	1	—	1	—	
80. Infantile Convulsions	—	8	3	8	—	
81. Chorea	—	—	—	—	—	
82. A.—Hysteria	—	10	—	10	—	
B.—Neuritis	3	31	—	34	—	
C.—Neurasthenia	2	13	—	15	—	
83. Cerebral Softening	—	—	—	—	—	
84. Other affections of the Nervous System, such as Paralysis Agitans	—	21	3	21	1	
85. Affections of the Organs of Vision—						
(*a*) Diseases of the Eye	—	29	—	29	5	
(*b*) Conjunctivitis	4	131	—	135	7	
(*c*) Trachoma	—	6	—	6	—	
(*d*) Tumours of the Eye	—	7	—	7	2	
(*e*) Other affections of the Eye	7	37	—	44	3	
86. Affections of the Ear or Mastoid Sinus	2	36	1	38	—	
IV.—*Affections of the Circulatory System.*						
87. Pericarditis	1	4	1	5	1	
88. Acute Endocarditis or Myocarditis	1	16	2	17	—	
89. Angina Pectoris	—	1	—	1	—	
90. Other Diseases of the Heart—	1	6	—	7	—	
(*a*) Valvular—						
Mitral	—	39	10	39	1	
Aortic	—	18	6	18	1	
Tricuspid	—	—	—	—	—	
Pulmonary	—	4	—	4	—	
(*b*) Myocarditis	3	19	6	22	1	
91. Diseases of the Arteries—						
(*a*) Aneurism	—	6	1	6	—	
(*b*) Arterio-Sclerosis	—	4	1	4	—	
(*c*) Other diseases	—	5	—	5	—	
92. Embolism or Thrombosis (non-cerebral)	—	3	1	3	—	

Diseases.	Remaining in Hospital at 31st March, 1927–28.	Yearly Total.		Total Cases Treated.	Remaining in Hospital at 31st March, 1928–29.	Remarks.
		New Cases.	Deaths.			
IV.—*Affections of the circulatory System (contd.).*						
93. Diseases of Veins—						
Hæmorrhoids	4	76	—	80	2	
Varicose Veins	—	2	—	2	—	
Phlebitis	—	4	1	4	1	
94. Diseases of the Lymphatic System— ..	—	3	—	3	—	
Lymphangitis	3	20	—	23	—	
Lymphadenitis, Bubo (non-specific)	9	79	1	88	5	
95. Hæmorrhage of undetermined cause	—	4	1	4	—	
96. Other affections of the Circulatory System	—	—	—	—	—	
V.—*Affections of the Respiratory System.*						
97. Diseases of the Nasal Passages—	—	—	—	—	—	
Adenoids	—	4	1	4	—	
Polypus	—	6	—	6	—	
Rhinitis	13	2	—	15	—	
Coryza	1	20	—	21	—	
98. Affections of the Larynx—						
Laryngitis	—	23	1	23	—	
99. Bronchitis—						
(*a*) Acute	4	307	10	311	9	
(*b*) Chronic	1	69	4	70	2	
100. Broncho-Pneumonia	1	124	42	125	3	
101. Pneumonia—						
(*a*) Lobar	9	433	115	442	10	
(*b*) Unclassified	4	107	26	111	3	
102. Pleurisy, Empyema	8	90	5	98	2	
103. Congestion of the Lungs ..	—	—	—	—	—	
104. Gangrene of the Lungs ..	—	—	—	—	—	
105. Asthma	—	33	1	33	1	
106. Pulmonary Emphysema ..	—	—	—	—	—	
107. Other affections of the Lungs—	—	23	2	23	—	
Pulmonary Spirochaetosis	—	3	—	3	—	
VI.—*Diseases of the Digestive System.*						
108. A.—Diseases of Teeth or Gums—						
Caries, Pyorrhœa, etc. ..	2	39	1	41	2	
B.—Other affections of the Mouth—	—	1	1	1	—	
Stomatitis	1	20	2	21	—	
Glossitis, etc.	—	4	—	4	1	
109. Affections of the Pharynx or Tonsils—						
Tonsillitis	1	49	—	50	2	
Pharyngitis	1	20	—	21	—	
110. Affections of the Œsophagus ..	—	1	—	1	—	
111. A.—Ulcer of the Stomach ..	—	19	2	19	2	
B.—Ulcer of the Duodenum ..	—	9	2	9	1	
112. Other affections of the Stomach—	—	14	—	14	—	
Gastritis	—	41	—	41	1	
Dyspepsia, etc.	—	38	1	38	—	
113. Diarrhœa and Enteritis—						
Under two years	2	84	9	86	3	
114. Diarrhœa and Enteritis—						
Two years and over ..	5	139	15	144	2	
Colitis	1	27	—	28	—	
Ulceration	—	6	1	6	—	
114*a*. Sprue	—	—	—	—	—	
115. Ankylostomiasis	9	84	4	93	5	
116. Diseases due to Intestinal Parasites—						
(*a*) Cestoda (Tænia) ..	1	30	—	31	—	
(*b*) Tremotoda (Flukes) ..	—	—	—	—	—	
(*c*) Nematoda (other than Ankylostoma)—	—	6	—	6	—	
Ascaris	1	22	1	23	1	
Trichocephalus dispar	—	—	—	—	—	
Trichina	—	—	—	—	—	
Dracunculus	17	219	—	236	9	
Strongylus	—	—	—	—	—	
Oxyuris	—	—	—	—	—	
(*d*) Coccidia	—	—	—	—	—	
(*e*) Other parasites ..	—	9	—	9	—	
(*f*) Unclassified	—	2	—	2	—	

Diseases.	Remaining in Hospital at 31st March, 1927–28.	Yearly Total.		Total Cases Treated.	Remaining in Hospital at 31st March, 1928–29.	Remarks.
		New Cases.	Deaths.			
VI.—*Diseases of the Digestive System* (*contd.*)						
117. Appendicitis	2	44	4	46	2	
118. Hernia	18	237	15	255	9	
119. A.—Affections of the Anus, Fistula, etc.	10	68	3	78	4	
B.—Other affections of the Intestines—	—	17	3	17	—	
Enteroptosis	—	2	—	2	—	
Constipation	3	58	—	61	4	
120. Acute Yellow Atrophy of the Liver	—	—	—	—	—	
121. Hydatid of the Liver	—	—	—	—	—	
122. Cirrhosis of the Liver—						
(*a*) Alcoholic	—	1	1	1	—	
(*b*) Other forms	—	14	6	14	2	
123. Biliary Calculus	—	1	—	1	—	
124. Other affections of the Liver—	—	—	—	—	—	
Abscess	3	13	6	16	1	
Hepatitis	1	37	6	38	1	
Cholecystitis	—	4	—	4	—	
Jaundice	—	38	2	38	1	
125. Diseases of the Pancreas ..	—	—	—	—	—	
126. Peritonitis (of unknown cause) ..	—	17	2	17	1	
127. Other affections of the Digestive System	1	19	2	20	—	
VII.—*Diseases of the Genito-urinary System* (*non-Venereal*).						
128. Acute Nephritis	6	88	17	94	7	
129. Chronic Nephritis	3	67	16	70	3	
130. A.—Chyluria	—	1	—	1	—	
B.—Schistosomiasis	1	24	2	25	3	
131. Other affections of the Kidneys—	—	3	—	3	—	
Pyelitis, etc.	—	10	1	10	1	
132. Urinary Calculus	—	14	1	14	2	
133. Diseases of the Bladder—	—	—	—	—	—	
Cystitis	2	53	5	55	2	
134. Diseases of the Urethra—						
(*a*) Stricture	11	106	10	117	5	
(*b*) Other	4	28	2	32	3	
135. Diseases of the Prostate—	—	28	2	28	—	
Hypertrophy	—	2	—	2	—	
Prostatitis	3	9	4	12	1	
136. Diseases (non-Venereal) of the Genital Organs of Man—	3	5	—	8	1	
Epididymitis	1	27	—	28	2	
Orchitis	3	62	2	65	2	
Hydrocele	5	62	3	67	2	
Ulcer of Penis	2	43	—	45	2	
Phimosis and Paraphimosis	1	100	—	101	2	
137. Cysts or other non-malignant Tumours of the Ovaries ..	1	5	1	6	—	
138. Salpingitis—	—	25	3	25	2	
Abscess of the Pelvis ..	19	13	—	32	—	
139. Uterine Tumours (non-malignant)	—	23	3	23	1	
140. Uterine Hæmorrhage (non-puerperal)	—	1	—	1	—	
141. A.—Metritis	—	26	—	26	1	
B.—Other affections of the Female Genital Organs—	3	24	1	27	1	
Displacements of Uterus ..	1	53	1	54	1	
Amenorrhœa	—	2	—	2	—	
Dysmenorrhœa	—	26	—	26	—	
Leucorrhœa	—	3	—	3	—	
142. Diseases of the Breast (non-puerperal)—						
Mastitis	—	11	—	11	2	
Abscess of Breast	—	3	—	3	—	
VIII.—*Puerperal State.*						
143. Normal Labour	1	122	—	123	16	
B.—Accidents of Pregnancy—						
(*a*) Abortion	1	38	2	39	2	
(*b*) Ectopic Gestation ..	—	2	—	2	—	
(*c*) Other accidents of Pregnancy	—	63	5	63	2	
144. Puerperal Hæmorrhage	—	6	2	6	—	
145. Other accidents of Parturition	2	57	15	59	2	
146. Puerperal Septicæmia	—	4	2	4	—	

Diseases.	Remaining in Hospital at 31st March, 1927–28.	Yearly Total.		Total Cases Treated.	Remaining in Hospital at 31st March, 1928–29.	Remarks.
		New Cases.	Deaths.			
VIII :—*Puerperal State* (*contd.*)						
147. Phlegmasia Dolens	—	—	—	—	—	
148. Puerperal Eclampsia	—	5	1	5	—	
149. Sequelæ of Labour	—	17	3	17	1	
150. Puerperal affections of the Breast	—	2	—	2	—	
IX.—*Affections of the Skin and Cellular Tissues.*						
151. Gangrene	1	19	8	20	—	
152. Boil—	—	22	—	22	1	
Carbuncle	—	54	—	54	1	
153. Abscess—	14	278	7	292	7	
Whitlow	2	108	—	110	5	
Cellulitis	18	311	17	329	19	
154. A.—Tinea	—	7	—	7	—	
B.—Scabies	—	14	—	14	—	
155. Other Diseases of the Skin—	—	13	—	13	—	
Erythema	1	4	—	5	—	
Urticaria	—	26	—	26	—	
Eczema	2	20	—	22	2	
Herpes	—	6	—	6	—	
Psoriasis	—	—	—	—	—	
Elephantiasis	5	35	4	40	5	
Myiasis	—	26	—	26	4	
Chiggers	—	1	—	1	1	
Cutaneous Leishmaniasis	—	—	—	—	—	
Ulcers	93	470	3	563	69	
X.—*Diseases of Bones and Organs of Locomotion* (*other than Tuberculous*).						
156. Diseases of Bones—						
Osteitis	—	71	—	71	5	
157. Diseases of Joints—						
Arthritis	8	255	3	263	2	
Synovitis	1	72	1	73	7	
158. Other Diseases of Bones or Organs of Locomotion	7	81	—	88	5	
XI.—*Malformations.*						
159. Malformations—						
Hydrocephalus	—	—	—	—	—	
Hypospadias	—		—	—	—	
Spina Bifida, etc.	3	3	—	6	—	
XII.—*Diseases of Infancy.*						
160. Congenital Debility	1	29	8	30	2	
161. Premature Birth	—	11	8	11	1	
162. Other affections of Infancy	4	87	3	91	3	
163. Infant neglect (infants of three months or over)	—	1	—	1	—	
XIII.—*Affections of Old Age.*						
164. Senility—						
Senile Dementia	—	3	2	3	1	
XIV.—*Affections produced by External Causes.*						
165. Suicide by Poisoning	—	3	3	3	—	
166. Corrosive Poisoning (intentional)	1	—	—	1	—	
167. Suicide by Gas Poisoning	—	—	—	—	—	
168. Suicide by Hanging or Strangulation	—	—	—	—	—	
169. Suicide by Drowning	—	—	—	—	—	
170. Suicide by Firearms	—	—	—	—	—	
171. Suicide by cutting or stabbing Instruments	—	4	4	4	—	
172. Suicide by jumping from a height	—	—	—	—	—	
173. Suicide by crushing	—	—	—	—	—	
174. Other Suicides	—	—	—	—	—	
175. Food Poisoning—	—	5	1	5	—	
Botulism	—	—	—	—	—	
176. Attacks of poisonous animals—	—	—	—	—	—	
Snake Bite	—	21	3	21	—	
Insect Bite	—	4	—	4	—	
177. Other accidental Poisonings	1	6	1	7	—	
178. Burns (by Fire)	3	84	8	87	3	
179. Burns (other than by Fire)	—	19	4	19	3	
180. Suffocation (accidental)	—	—	—	—	—	
181. Poisoning by Gas (accidental)	—	—	—	—	—	
182. Drowning (accidental)	—	—	—	—	—	
183. Wounds (by Firearms, war excepted)	12	93	22	105	9	

Diseases.	Remaining in Hospital at 31st March, 1927–28.	Yearly Total.		Total Cases Treated.	Remaining in Hospital at 31st March, 1928–29.	Remarks.
		New Cases.	Deaths.			
XIV :—*Affections produced by External Causes (contd.)*						
184. Wounds (by cutting or stabbing Instruments)	21	462	57	483	53	
185. Wounds (by Fall)	6	177	5	183	15	
186. Wounds (in Mines or Quarries)	2	4	—	6	1	
187. Wounds (by Machinery) ..	1	10	—	11	1	
188. Wounds (crushing, e.g., railway accidents, etc.)	14	239	15	253	28	
189. Injuries inflicted by Animals, Bites, Kicks, etc.	1	40	—	41	2	
190. Wounds inflicted on Active Service	—	—	—	—	—	
191. Executions of civilians by belligerents	—	—	—	—	—	
192. A.—Over fatigue	1	—	—	1	—	
B.—Hunger or Thirst	—	6	2	6	—	
193. Exposure to Cold, Frost bite, etc.	—	—	—	—	—	
194. Exposure to Heat—						
Headstroke	—	—	—	—	—	
Sunstroke	—	3	—	3	—	
195. Lightning Stroke	—	2	—	2	—	
196. Electric Shock	—	—	—	—	—	
197. Murder by Firearms	—	—	—	—	—	
198. Murder by cutting or stabbing Instruments	—	—	—	—	—	
199. Murder by other means ..	—	—	—	—	—	
200. Infanticide (Murder of an infant under one year)	—	—	—	—	—	
201. A.—Dislocation	2	55	—	57	2	
B.—Sprain	—	70	—	70	—	
C.—Fracture	33	302	20	335	29	
202. Other external Injuries	11	412	4	423	26	
203. Deaths by Violence of unknown cause	—	—	—	—	—	
XV.—*Ill-Defined Diseases.*						
204. Sudden Death (cause unknown)	—	—	—	—	—	
205. A.—Diseases not already specified or ill-defined—						
Ascites	2	30	2	32	3	
Œdema	2	20	—	22	1	
Asthenia	1	29	15	30	3	
Shock	—	7	2	7	—	
Hyperpyrexia	—	7	1	7	—	
B.—Malingering	—	53	—	53	—	
XVI.—*Diseases, the total of which have not caused 10 Deaths* ..	—	5	—	5	—	
Total	635	12,573	1,045	13,208	695	

Surgical Operations :—

Major	1,136.
Minor	2,550.

TABLE VI.

RETURN OF DISEASES (OUT-PATIENTS) FOR THE YEAR 1928–29.

Diseases.	Male.	Female.
I.—*Epidemic, Endemic, and Infectious Diseases.*		
1. Enteric Group—		
(*a*) Typhoid Fever	14	—
(*b*) Paratyphoid A.	—	—
(*c*) Paratyphoid B.	5	1
(*d*) Type not defined	1	—
2. Typhus	—	—
3. Relapsing Fever	8	—
4. Undulant Fever	—	—
5. Malaria—		
(*a*) Tertian	3,055	2,304
(*b*) Quartan	365	127
(*c*) Aestivo-autumnal	2,896	1,379
(*d*) Cachexia	564	446
(*e*) Blackwater	5	1
(*f*) Unclassified	2,264	1,636
6. Smallpox—	8	18
Alastrim	—	—
7. Measles	257	165
8. Scarlet Fever	—	—
9. Whooping Cough	522	470
10. Diphtheria	—	—
11. Influenza	571	147
12. Miliary Fever	—	—
13. Mumps	53	19
14. Cholera	—	—
15. Epidemic diarrhœa	64	59
16. Dysentery—		
(*a*) Amœbic	646	285
(*b*) Bacillary	163	41
(*c*) Undefined or due to other causes	394	189
17. Plague—		
(*a*) Bubonic	—	—
(*b*) Pneumonic	—	—
(*c*) Septicæmic	—	—
(*d*) Undefined	—	—
18. Yellow Fever	—	—
19. Spirochætosis ictero-hæmorrhagica	—	—
20. Leprosy	1,032	376
21. Erysipelas	5	7
22. Acute Poliomyelitis	9	3
23. Encephalitis Lethargica	—	—
24. Epidemic Cerebro-spinal Fever	—	—
25. Other Epidemic Diseases—		
(*a*) Rubeola (German Measles)	12	2
(*b*) Varicella (Chicken-pox)	208	43
(*c*) Kala-azar	—	—
(*d*) Phlebotomus Fever	—	—
(*e*) Dengue.	4	5
(*f*) Epidemic Dropsy	—	—
(*g*) Yaws	30,430	23,776
(*h*) Trypanosomiasis	26	1
26. Glanders	—	—
27. Anthrax	1	1
28. Rabies	—	—
29. Tetanus	63	14
30. Mycosis	16	6
31. Tuberculosis, Pulmonary and Laryngeal	457	173
32 Tuberculosis of the Meninges or Central Nervous System	5	—
33. Tuberculosis of the Intestines or Peritoneum	13	4
34. Tuberculosis of the Vertebral Column	28	9
35. Tuberculosis of Bones and Joints	46	18
36. Tuberculosis of other organs—		
(*a*) Skin or Subcutaneous Tissue (Lupus)	4	3
(*b*) Bones	15	4
(*c*) Lymphatic System	46	18
(*d*) Genito-urinary	—	1
(*e*) Other organs	19	2
37. Tuberculosis disseminated—		
(*a*) Acute	5	—
(*b*) Chronic	—	—
38. Syphilis—		
(*a*) Primary	526	84
(*b*) Secondary	359	302
(*c*) Tertiary	796	861
(*d*) Hereditary	136	87
(*e*) Period not indicated	69	31

	Diseases.	Male.	Female.
39.	Soft Chancre	339	5
40.	A.—Gonorrhœa and its complications	2,971	1,386
	B.—Gonorrhœal Ophthalmia	109	27
	C.—Gonorrhœal Arthritis	1,396	22
	D.—Granuloma Venereum	6	1
41.	Septicæmia	9	4
42.	Other Infectious Diseases—		
	Trypanosomiasis	11	3
	II.—*General Diseases not mentioned above.*		
43.	Cancer or other malignant Tumours of the Buccal Cavity	8	—
44.	Cancer or other malignant Tumours of the Stomach or Liver	17	7
45.	Cancer or other malignant Tumours of the Peritoneum, Intestines, Rectum	4	10
46.	Cancer or other malignant Tumours of the Female Genital Organs	—	16
47.	Cancer or other malignant Tumours of the Breast	—	2
48.	Cancer or other malignant Tumours of the Skin	5	4
49.	Cancer or other malignant Tumours of Organs not specified	57	9
50.	Tumours non-Malignant	198	74
51.	Acute Rheumatism	—	—
52.	Chronic Rheumatism	4,272	2,521
53.	Scurvy (including Barlow's Disease)	3	3
54.	Pellagra	—	—
55.	Beri-Beri	16	1
55*a*.	Avitaminosis	3	—
56.	Rickets	37	15
17.	Diabetes (not including Insipidus)	9	1
58.	Anæmia—		
	(*a*) Pernicious	19	97
	(*b*) Other Anæmias and Chlorosis	330	241
59.	Diseases of the Pituitary Body	3	—
60.	Diseases of the Thyroid Gland,		
	(*a*) Exophthalmic Goitre	7	12
	(*b*) Other diseases of the Thyroid Gland, Myxœdema	27	8
61.	Diseases of the Para-Thyroid Glands	—	—
62.	Diseases of the Thymus	—	—
63.	Diseases of the Supra-Renal Glands	5	—
64.	Disease of the Spleen	78	88
65.	Leukæmia—		
	(*a*) Leukæmia	11	2
	(*b*) Hodgkin's Disease	5	2
66.	Alcoholism	33	—
67.	Chronic poisoning by mineral substances (lead mercury, etc.)	2	—
68.	Chronic poisoning by organic substances (Morphia, Cocaine, etc.)	—	—
69.	Other General Diseases—		
	Auto-intoxication	32	19
	Purpura Hæmorrhagica	—	—
	Hæmophilia	1	—
	Diabetes Insipidus	—	—
69*a*.	Pyrexia of unkown origin	37	6
	III.—*Affecions of the Nervous System and Organs of the Senses.*		
70.	Encephalitis (not including Encephalitis Lethargica)	—	—
71.	Meningitis (not including Tuberculous Meningitis or Cerebrospinal Meningitis)	26	2
72.	Locomotor Ataxia	20	1
73.	Other affections of the Spinal Cord	29	12
74.	Apoplexy—		
	(*a*) Hæmorrhage	18	15
	(*b*) Embolism	—	1
	(*c*) Thrombosis	3	—
75.	Paralysis—		
	(*a*) Hemiplegia	94	23
	(*b*) Other Paralyses	83	24
76.	General Paralysis of the Insane	3	1
77.	Other forms of Mental Alienation	35	13
78.	Epilepsy	102	33
79.	Eclampsia, Convulsions (nonpuerperal) 5 years or over	6	1
80.	Infantile Convulsions	31	25
81.	Chorea	—	—
82.	A.—Hysteria	11	21
	B.—Neuritis	350	131
	C.—Neurasthenia	116	54
83.	Cerebral Softening	1	1
84.	Other affections of the Nervous System, such as Paralysis Agitans	62	35
85.	Affections of the Organs of Vision—		
	(*a*) Diseases of the Eye	620	159
	(*b*) Conjunctivitis	2,680	1,275
	(*c*) Trachoma	65	46
	(*d*) Tumours of the Eye	184	20
	(*e*) Other affections of the Eye	542	224

	Diseases.	*Male.*	*Female.*
	II.—*General Diseases not mentioned above* (*contd.*).		
86.	Affections of the Ear or Mastoid Sinus	1,568	815
	IV.—*Affections of the Circulatory System.*		
87.	Pericarditis	30	7
88.	Acute Endocarditis or Myocarditis	69	37
89.	Angina Pectoris	6	—
90.	Other Diseases of the Heart—	10	10
	(*a*) Valvular—		
	Mitral	196	80
	Aortic	63	12
	Tricuspid	9	3
	Pulmonary	5	2
	(*b*) Myocarditis	90	58
91.	Diseases of the Arteries—		
	(*a*) Aneurism	15	5
	(*b*) Arterio-Sclerosis	42	7
	(*c*) Other diseases	23	8
92.	Embolism or Thrombosis (non-cerebral)	—	1
93.	Diseases of the Veins—		
	Hæmorrhoids	273	90
	Varicose Veins	20	21
	Phlebitis	20	2
94.	Diseases of the Lymphatic System—	7	4
	Lymphangitis	71	3
	Lymphadenitis, Bubo (non-specific)	408	95
95.	Hæmorrhage of undertermined cause	18	18
96.	Other affections of the Circulatory System	27	11
	V.—*Affections of the Respiratory System.*		
97.	Diseases of the Nasal Passages—		
	Adenoids	36	9
	Polypus	11	12
	Rhinitis	138	49
	Coryza	713	165
	Ill defined	2	—
98.	Affections of the Larynx—		
	Laryngitis	259	98
99.	Bronchitis—		
	(*a*) Acute	4,336	1,836
	(*b*) Chronic	3,130	1,101
100.	Broncho-Pneumonia	246	99
101.	Pneumonia—		
	(*a*) Lobar	442	111
	(*b*) Unclassified	66	37
102.	Pleurisy, Empyema	422	91
103.	Congestion of the Lungs	326	323
104.	Gangrene of the Lungs	4	7
105.	Asthma	199	82
106.	Pulmonary Emphysema	11	2
107.	Other affections of the Lungs—	1,536	2,107
	Pulmonary Spirochætosis	12	10
	VI.—*Diseases of the Digestive System.*		
108.	A.—Diseases of Teeth or Gums—Caries, Pyorrhœa, etc.	1,663	994
	B.—Other affections of the Mouth	59	94
	Stomatitis	471	274
	Glossitis, etc.	192	137
109.	Affections of the Pharynx or Tonsils—		
	Tonsillitis	441	226
	Pharyngitis	253	98
110.	Affections of the Œsophagus	4	1
111.	A.—Ulcer of the Stomach	13	10
	B.—Ulcer of the Duodenum	6	—
112.	Other affections of the Stomach—	26	16
	Gastritis	811	462
	Dyspepsia, etc.	2,243	681
113.	Diarrhœa and Enteritis—		
	Under two years	1,276	1,015
114.	Diarrhœa and Enteritis—		
	Two years and over	1,606	677
	Colitis	217	147
	Ulceration	89	11
114*a*.	Sprue	—	–
115.	Ankylostomiasis	162	112
116.	Diseases due to Intestinal Parasites—		
	(*a*) Cestoda (Tænia)	690	283
	(*b*) Tremotoda (Flukes)	—	—
	(*c*) Nematoda (other than Ankylostoma)—	—	—

	Diseases.	Male.	Female.
	VI.—*Diseases of Digestive System (contd.)*		
	Ascaris	521	198
	Trichocephalus dispar	—	—
	Trichina	—	—
	Dracunculus	660	213
	Strongylus	91	42
	Oxyuris	43	27
	(*d*) Coccidia	—	—
	(*e*) Other parasites	117	157
	(*f*) Unclassified	81	16
117.	Appendicitis	40	13
118.	Hernia	553	50
119.	A.—Affections of the Anus, Fistula, etc.	190	82
	B.—Other affections of the Intestines—	9	1
	Enteroptosis	3	5
	Constipation	7,072	1,944
120.	Acute Yellow Atrophy of the Liver	—	—
121.	Hydatid of the Liver	—	—
122.	Cirrhosis of the Liver—		
	(*a*) Alcoholic	1	2
	(*b*) Other forms	4	2
122.	Biliary Calculus	6	2
124.	Other affections of the Liver	5	—
	Abscess	25	11
	Hepatitis	268	52
	Cholecystitis	16	3
	Jaundice	93	32
125.	Diseases of the Pancreas	—	—
126.	Peritonitis (of unknown cause)	18	15
127.	Other affections of the Digestive System	203	70
	VII.—*Diseases of the Genito-urinary System (non-Venereal)*		
128.	Acute Nephritis	171	81
129.	Chronic do.	116	64
130.	A.—Chyluria	15	—
	B.—Schistosomiasis	182	29
131.	Other affections of the Kidneys—	18	2
	Pyelitis, etc.	23	13
132.	Urinary Calculus	8	1
133.	Diseases of the Bladder—	15	5
	Cystitis	283	193
134.	Diseases of the Urethra—		
	(*a*) Stricture	292	—
	(*b*) Other	276	12
135.	Diseases of the Prostate—		
	Hypertrophy	2	—
	Prostatitis	67	—
136.	Diseases (non-Venereal) of the Genital Organs of Man—	22	—
	Epididymitis	188	—
	Orchitis	261	—
	Hydrocele	233	—
	Ulcer of Penis	202	—
	Phimosis, Para phimosis	73	—
137.	Cysts or other non-malignant Tumours of the Ovaries	—	25
138.	Salpingitis—	—	49
	Abscess of the Pelvis	—	55
139.	Uterine Tumours (non-malignant)	—	30
140.	Uterine Hæmorrhage (non-puerperal)	—	31
141.	A.—Metritis	—	163
	B.—Other affections of the Female Genital Organs—	—	138
	Displacements of Uterus	—	50
	Amenorrhœa	—	256
	Dysmenorrhœa	—	388
	Leucorrhœa	—	161
142.	Diseases of the Breast (non-puerperal)—	—	1
	Mastitis	2	68
	Abscess of Breast	—	38
	VIII.—*Puerperal State.*		
143.	A.—Normal Labour	—	89
	Ante-Natal Clinic	—	2,811
	B.—Accidents of Pregnancy—		
	(*a*) Abortion	—	81
	(*b*) Ectopic Gestation	—	6
	(*c*) Other accidents of Pregnancy	—	65
144.	Puerperal Hæmorrhage	—	1
145.	Other accidents of Parturition	—	13
146.	Puerperal Septicæmia	—	8
147.	Phlegmasia Dolens	—	1
148.	Puerperal Eclampsia	—	2

Diseases.	*Male.*	*Female.*
VIII.—*Puerperal State* (*contd*).		
149. Sequelæ of Labour	—	21
149*a*. Post-Natal attendance on Mothers and Infants	—	788
150. Puerperal affections of the Breast	—	9
IX.—*Affections of the Skin and Cellular Tissues.*		
151. Gangrene	45	16
152. Boil—	728	272
Carbuncle	389	147
153. Abscess—	527	146
Whitlow	587	158
Cellulitis	1,225	339
154. A.—Tinea	767	381
B.—Scabies	710	313
155. Other Diseases of the Skin—	946	788
Dermatitis	42	19
Erythema	121	75
Urticaria	239	112
Eczema	445	241
Herpes	168	27
Psoriasis	75	33
Elephantiasis	121	42
Myiasis	11	19
Chiggers	40	15
Cutaneous Leishmaniasis	—	—
Ulcers	6,970	2,678
X.—*Diseases of Bones and Organs of Locomotion* (*other than Tuberculous*).		
156. Diseases of Bones—	28	34
Osteitis	563	376
157. Diseases of Joints—		
Arthritis	1,064	398
Synovitis	445	156
158. Other Diseases of Bones or Organs of Locomotion	838	225
XI.—*Malformations.*		
159. Malformations—		
Hydrocephalus	5	4
Hypospadias	5	—
Spina Bifida, etc.	22	11
XII.—*Diseases of Infancy.*		
160. Congenital Debility	57	46
161. Premature Birth	7	5
162. Other affections of Infancy	348	319
163. Infant neglect (infants of three months or over)	52	48
XIII.—*Affections of Old Age.*		
164 Senility—	29	28
Senile Dementia	10	4
XIV —*Affections produced by External Causes.*		
165. Suicide by Poisoning	—	1
166. Corrosive Poisoning (intentional)	2	—
167. Suicide by Gas Poisoning	—	—
168. Suicide by Hanging or Strangulation	4	—
169. Suicide by Drowning	—	1
170. Suicide by Firearms	4	—
171. Suicide by cutting or stabbing Instruments	2	—
172. Suicide by jumping from a height	—	—
173. Suicide by crushing	—	—
174. Other Suicides	2	—
175. Food Poisoning	4	3
Botulism	—	—
176. Attacks of poisonous animals—		
Snake Bite	36	3
Insect Bite	128	43
177. Other accidental Poisonings	9	5
178. Burns (by Fire)	250	121
179. Burns (other than by Fire)	39	23
180. Suffocation (accidental)	1	—
181 Poisoning by Gas (accidental)	1	—
182. Drowning (accidental)	4	2
183. Wounds (by Firearms, war excepted)	56	3
184. Wounds (by cutting or stabbing Instruments)	3,154	629
185. Wounds (by Fall)	1,519	299
186. Wounds (in Mines or Quarries)	130	—
187. Wounds (by Machinery)	600	50

	Diseases.	*Male.*	*Female.*
	XIV.—*Affections produced by External Causes* (*contd.*).		
188.	Wounds (crushing, e.g. railway accidents, etc.)	802	155
189.	Injuries inflicted by Animals, Bites, Kicks, etc.	319	91
190.	Wounds inflicted on Active Service	—	—
191.	Executions of civilians by belligerents	—	—
192.	A.—Over fatigue	—	—
	B.—Hunger or Thirst	7	1
193.	Exposure to Cold, Frost bite, etc.	—	—
194.	Exposure to Heat—		
	Heatstroke	1	—
	Sunstroke	3	1
195.	Lightning Stroke	1	—
196.	Electric Shock	1	—
197.	Murder by Firearms	—	—
198.	Murder by cutting— or stabbing Instruments	2	1
199.	Murder by other means	—	—
200.	Infanticide (Murder of an infant under one year)	—	—
201.	A.—Dislocation	109	56
	B.—Sprain	529	77
	C.—Fracture	272	69
202.	Other external Injuries	2,718	1,020
203.	Deaths by Violence of unknown cause	—	—
	XV.—*Ill-Defined Diseases.*		
204.	Sudden Death (cause unknown)	1	—
205.	A.—Diseases not already specified or ill-defined—	—	—
	Ascites	42	24
	Oedema	122	64
	Asthenia	278	139
	Shock	35	—
	Hyperpyrexia	51	39
	Other Diseases	432	380
	B.—Malingering	216	20
	XVI.—*Diseases, the total of which have not caused* 10 *Deaths.*	125	26
	Abdominal pain, etc.	373	968
	Inspection	46	37
	Total	128,934	73,098 128,934
	Total		202,032

APPENDIX A.

HOSPITAL BED ACCOMMODATION AND DISPENSARIES FOR GOLD COAST COLONY, ASHANTI, NORTHERN TERRITORIES AND BRITISH MANDATED TOGO.

Colony.	Hospital.		European.				African.				Dispensaries.	Medical Staff. (Medical Officers and Women Medical Officers.)	Remarks.
	Euro-pean.	Afri-can.	Total Beds at present.		Number of Beds assigned.		Total Beds at present.		Number of Beds assigned.				
			M.	F.	M.	F.	M.	F.	M.	F.			
Accra	1	1	17	3	17	3	153	50	181	50	2	5 (M.O's)	
,, Cantonments	—	1	—	—	—	—	6	—	6	—	1	1 (M.O.)	
,, Maternity	—	1	—	—	—	—	—	19+14 cots.	—	19+14 cots.	—	1 (W.M.O.)	
,, Princess Marie Louise	—	1	—	—	—	—	—	14 cots	—	14 cots	1	1 (W.M.O.)	A children's Hospital.
,, Christiansborg	—	—	—	—	—	—	—	—	—	—	1	1 (W.M.O.)	Infant Welfare Clinic.
,, Achimota	—	1	—	—	—	—	10	10	10	10	1	1 (M.O.)	Prince of Wales' College.
Sekondi	1	1	17	4	17	4	25	5	23	5	1	2 (M.O's)	
,,	—	—	—	—	—	—	—	—	—	—	1	1 (W.M.O.)	Infant Welfare Clinic.
Chama	—	—	—	—	—	—	—	—	—	—	1	1 (W.M.O.)	do. visited by W.M.O.
Cape Coast	1	1	5	—	6	—	19	6	13	9	1	1 (M.O.)	
Saltpond	—	1	—	—	—	—	8	2	8	2	1	1 (M.O.)	
Winneba	1	1	6	2	6	2	13	7	10	6	1	1 (M.O.)	New Hospital to be built next year.
Ada	—	1	—	—	—	—	4	4	8	4	1	1 (M.O.)	
Keta	—	1	—	—	—	—	12	4	12	4	1	1 (M.O.)	
Kibi	—	1	—	—	—	—	14	4	15	4	1	1 (M.O.)	
Mpraeso	—	1	—	—	—	—	5	—	5	—	1	1 (M.O.)	
Dunkwa	—	1	—	—	—	—	10	4	10	4	1	1 (M.O.)	
Takoradi	(1)	(1)	8	6	13	10	18	8	18	8	(1)	1 (M.O.)	(Not ready to open at end of year.)
Tarkwa	—	1	—	—	—	—	11	—	11	—	1	1 (M.O.)	
Axim	1	1	6	2	6	2	8	2	8	2	1	1 (M.O.)	New Hospital under construction.
Wioso	—	1	—	—	—	—	4	—	4	—	1	—	Not yet staffed.
Akuse	—	1	—	—	—	—	11	3	11	6	1	1 (M.O.)	
Koforidua	—	1	—	—	—	—	14	6	13	6	1	1 (M.O.)	
Elmina	—	1	—	—	—	—	—	—	—	—	1	1 (M.O.)	(Visiting from C. Coast.)
Oda	—	1	—	—	—	—	12	4	12	4	1	1 (M.O.)	
Nsawam	—	1	—	—	—	—	4*	—	3	—	1	1 (M.O.)	*One bed on verandah.
Total	5	22	51	11	52	11	343	130+28 cots.	363	135+28 cots.	25	27	

APPENDIX A.—*contd.*

HOSPITAL BED ACCOMMODATION AND DISPENSARIES FOR GOLD COAST COLONY, ASHANTI, NORTHERN TERRITORIES AND BRITISH MANDATED TOGO.

Ashanti.	Hospital.		European.				African.				Dispensaries.	Medical Staff.	Remarks.
	Euro-pean.	Afri-can.	Total Beds at present.		Number of Beds assigned.		Total Beds at present.		Number of Beds assigned.				
			M.	F.	M.	F.	M.	F.	M.	F.			
Kumasi	I	I	10	2	10	2	97	35+2 cots	104	35+2 cots	I	3 (M.O's)	
"	—	I	—	—	—	—	—	20 cots	—	20 cots	I	I (W.M.O.)	Infant Welfare Centre.
Bekwai	—	I	—	—	—	—	4	6	4	6	I	I (M.O.)	New Female Ward added.
Sunyani	—	I	—	—	—	—	6	2	6	4	I	I (M.O.)	New Hospital under construction.
[(Obuasi)	—	(I)*	—	—	—	—	—	—	—	—	(I)	(I)	Mines Medical Officer.]
Kintampo	—	I	—	—	—	—	18	12	18	12	I	I (M.O.)	14 beds added during the year.
Total	I	5	10	2	10	2	125	55+22 cots.	132	57+22 cots.	5	7	

*Mines Hospital.

Northern Territories.	Euro-pean.	Afri-can.	M.	F.	M.	F.	M.	F.	M.	F.			
Tamale	I	I	4	2	6	2	20	4	20	4	I	2 (M.O's)	
Wa	—	I	—	—	—	—	—	—	18	3	I	I (M.O.)	
Zuarungu	—	I	—	—	—	—	5	—	8	—	I	I (M.O.)	
Salaga	—	I	—	—	—	—	6	2	6	2	I	I (M.O.)	
No. I Travelling Dispensary	—	—	—	—	—	—	—	—	—	—	I	I (M.O.)	Used on Leprosy Investigation during the year.
No. 2 Travelling Dispensary	—	—	—	—	—	—	—	—	—	—	I	I (M.O.)	
Total	I	4	4	2	6	2	31	6	52	9	5	7	

APPENDIX A.—*contd.*

HOSPITAL BED ACCOMMODATION AND DISPENSARIES FOR GOLD COAST COLONY, ASHANTI, NORTHERN TERRITORIES AND BRITISH MANDATED TOGO.

Mandated Togo.	Hospital.		European.				African.				Dispensaries.	Medical Staff.	Remarks.
	European.	African.	Total Beds at present.		Number of Beds assigned.		Total Beds at present.		Number of Beds assigned.				
			M.	F.	M.	F.	M.	F.	M.	F.			
Ho	—	1	—	—	—	—	8	3	8	3	1	1 (M.O.)	
Kete Krachi	—	—	—	—	—	—	—	—	—	—	1	1 (M.O.)	
Yendi	—	—	—	—	—	—	—	—	12	—	1	1 (M.O.)	New Ward completed at end of year.
Total	—	1	—	—	—	—	8	3	20	3	3	3	

Contagious Diseases Hospitals.	European.	African.	M.	F.	M.	F.	M.	F.	M.	F.		Staff.	
Labadi	—	1	—	—	—	—	24	—	24	—	—	(1 M.O.H.)	Visiting
Cape Coast	—	1	—	—	—	—	28	—	29	—	—	(1 M.O.H.)	,,
Sekondi	—	1	—	—	—	—	26	24	26	24	—	(1 M.O.H.)	,,
Tarkwa	—	1	—	—	—	—	1	—	1	—	—	(1 M.O.H.)	,,
Winneba	—	1	—	—	—	—	8	6	8	6	—	(1 M.O.H.)	,,
Ada	—	1	—	—	—	—	8	—	8	—	—	(1 M.O.H.)	,,
Saltpond	—	1	—	—	—	—	6	—	6	—	—	(1 M.O.H.)	,,
Kumasi	—	1	—	—	—	—	38	36	38	36	—	(1 M.O.H.)	,,
Total	—	8	—	—	—	—	139	66	140	66	—	—	
Grand Total	7	40	65	15	68	15	646	260+50 cots	707	270+50 cots	39	44	

APPENDIX B.

REPORTS OF BLACKWATER FEVER IN AFRICANS.

No. 1.

Name, Toby. Sex, Male. Age, 35. Race, African (Nzima). Occupation Cook.

Date of arrival in district. Lived in Axim all his life.
Date of commencement of illness, 20th September, 1928.
Duration of illness, 10 days.
Result, Death.

PREVIOUS HISTORY.

Previous illness	Unknown
(*a*) Alcohol	Hard drinker
Recent fever and general conditions	Unknown
Recent Quinine	Nil
Exciting causes	Unknown
Prodromata	Unknown
Hour of onset of rigor, duration	Unknown
Hour of onset of blackwater	Unknown
Hour of onset of jaundice	Unknown
When admitted to hospital	28th September, 1928.

URINE.

Quantity	But little
Colour	Black.

TREATMENT.

Calomel gr. iii on 28th September, 1928, at 9 a.m.
Mist Alba ozs. iii on 28th September, 1928, at 11 a.m.
Mist Quinine oz. i t.d.s. 28th September, 1928, to 30th September, 1928.

GENERAL OBSERVATIONS.

It is to be regretted that this case was not seen by the Medical Officer until after death. The Medical Officer was sent for to see him on 26th, on which date he himself was put on the sick list. The patient died on 30th September, 1928. The Medical Officer made a Post Mortem examination at 9 a.m. on 1st October, 1928—the date he was taken off the sick list. Hence it is to be feared that this record will be of very little value.

The diagnosis is founded on P.M. findings and Pathologist's report.

JOHN R. FORDE,
Medical Officer.

POST MORTEM RECORD.

Skin	Nothing of note.
General nutrition and development	Good.
Rigor mortis	Conjunctivae Golden. Rigor mortis present. Tissues yellow.
Stomach	Stomach empty except for mucus no signs of haemorrhages. Condition normal.
Helminths	None seen.
Liver	Dark, enlarged, soft.
Spleen	Enlarged, soft, dark.
Kidneys	Both congested.
Bladder	Small amount of urine.

BACTERIOLOGICAL AND MICROSCOPICAL EXAMINATION.

Liver.—Cloudy, swelling with some hæmofuscin.
Kidneys.—Tubles packed with hæmatogenous debris.

POST MORTEM DIAGNOSIS AND GENERAL CONCLUSIONS.

Pathologist, Sekondi, states
" The findings are typical of blackwater."

JOHN R. FORDE,
Medical Officer.

31*st March*, 1929.

NO. 2.

Name, Effuah Effockuah. Sex, Female. Age, 10 years. Nationality, Fanti. Occupation, Domestic Work—not attending school. Date of arrival in district, about 9th February from Cape Coast.

Date of commencement of illness, 1st March, 1929.
Duration of illness, 3 days.
Result, Improved.
Removed by relatives.

PREVIOUS HISTORY.

Previous residence in tropics	Since birth.
Recent fever and general conditions	Complained of fever two days after arrival in Winneba—was given a dose of quinine and Castor oil—symptoms abated.
Recent quinine	Complained of fever on 1st was given one Tabloid quinine and dose of Castor oil—felt better on 2nd. Had chill on 3rd and passed Blackwater.

Mode of onset.	Time of appearance of Symptoms.
Hour of onset of rigor	9.30 a.m. 3rd March, 1929.
Hour of onset of blackwater	10.15 a.m. 3rd March, 1929.
Hour of onset of jaundice	No jaundice on admission.
When first seen	12.30 p.m. 3rd March, 1929.
When admitted to hospital	12 p.m. 3rd March, 1929.

URINE.

Urine passed at ..	10.15 a.m. (sample produced)	8.30 a.m. 4/3/29	10.25 4/3/29	8.30 5/3/29.
Quantity	2 ounces.	7½ oz. during night.	10 ounces.	13 ounces.
Colour	Porter coloured.	Reddish brown.	Greenish yellow.	Dark straw.
Haemoglobin or Methaemoglobin	Oxyhaemoglobin.	Nil.	Nil.	?Tryosine c̄ Triple Phosophate.
Albumen, approximate amount	25% by volume.	10% by volume.	About 3–5% by volume.	Trace but definite.

Blood taken at	12.30 p.m. 3rd March, 1929.	8.30 a.m. 4/3/29.
Malaria parasites	Nil.	Nil.
Pigmented leucocytes	Nil.	Nil.

GENERAL OBSERVATIONS.

12 p.m. 3rd March, 1929, Patient admitted to Hospital—Female, 10 years of age. General condition—Nourishment good. Arrived in Winneba from Cape Coast three weeks previously. Complained of fever a couple of days after arrival. Was given Quinine and ol Ricini—symptoms abated. Complained of feeling feverish on 1st March. Was given a dose of Castor oil and one tabloid (grs. V ?) Quinine. Felt better next day. On third morning she again complained of feverishness. Had a rigor. Felt urgent desire to pass water and on passing found it black. Urine and patient brought to hospital on 3rd. No vomiting, no jaundice. Heavy deposits in urine which is the colour of stout. A few casts and red blood corpuscles but even more interesting is the presence of Ova of Schistosoma Hæmatobium. There is *no history of previous passage of blood in urine* or any urgency or of symptoms referable to bladder. A few red blood corpuscles in urine and, spectroscopically, presence of oxyhæmoglobin.

4th March, 1929, had a good night. Appears well and is free from pain or ache—slight tinting of conjunctivæ. Bowels opened by enema, a massive stool with two round worms passed. Stool contains numerous ova or ascaris. Urine shows marked improvement ; no evidence of oxyhæmoglobin or of methæmoglobin.

Definite albumen but much less than on the previous day.

5th March, 1929. Is very comfortable. Conjunctivæ have cleared up. Makes no complaint—urine nearly normal.

Deposit small ; chiefly of crystals. Triple Phosphates and Tryosin (?) Ova of Schistosoma Hæmatobium more in evidence. Several giving rise to free living Miracidia during examination. A few red blood corpuscles present 12 noon. Relatives arrived from Cape Coast and insisted on removing patient with a view to taking her back to Cape Coast. Discharged 5th March, 1929.

S. L. BROHIER,
Senior Medical Officer.

13*th March*, 1929.

APPENDIX C.

REPORT ON TUBERCULOSIS, GOLD COAST HOSPITAL.

In general, "medical tuberculosis" is the commonest type, bone and glandular tuberculosis are frequent whilst lupus is rarely seen.

This report refers only to "medical tuberculosis," particularly the pulmonary type.

MORTALITY.

There is a striking difference when the mortality of pulmonary tuberculosis in Accra is compared with the mortality of the same disease in England. I have had the opportunity of both seeing and treating a large number of cases in this hospital, I have never seen any healed pulmonary tuberculosis lesions in the many autopsies I have attended.

Naturally, all cases treated have not been followed to a fatal termination. A large number leave hospital after a stay of weeks or months but the few of these who have been followed up did not appear to survive for long.

Nevertheless, there is evidence that the course of the disease varies somewhat among different classes of patient. The rapidly fatal type is mostly seen in the poorly nourished north country class, who are always found to be heavily parasitized and are at an advanced stage when they present themselves for treatment. Most of these patients die in the hospital.

Among the coastal peoples the course is longer and there is a greater tendency to chronicity. Quite recently I have been gratified to observe as a result of treatment, definite evidence of a developing resistance in some few of these patients.

The outlook with other medical tuberculous conditions is not so gloomy. Although tuberculous peritonitis shows a heavy mortality, there are many cases which re-act favourably to treatment. Tuberculous pleural effusion and glandular tuberculosis frequently show improvement if these conditions are localised.

One case of a school boy with a pleural effusion complicated by peritonitis (which was verified by laparotomy) made a remarkable recovery, and was enabled to return to Achimota to continue his studies. He has since been under close observation for a period of about twelve months and is at present in perfect health.

POST MORTEM MATERIAL AND OBSERVATIONS.

Autopsies performed on patients who had died of pulmonary tuberculosis almost invariably showed a wide-spread dissemination of the disease. The lesions were rarely confined to the lungs pleurae and mediastinal glands, but involved other tissues as well. The peritoneal glands and the intestinal wall were most frequently involved in cases which during life exhibited signs and symptoms of pulmonary tuberculosis. On several occasions I have also seen the meninges, pericardium, liver and spleen implicated in patients where the lungs were the primary focus of infection. Certain cases of glandular tuberculosis with splenic involvement were so extensive as to simulate Hodgkin's disease. Many cases of unexplained chronic adherent pericarditis diagnosed during life were revealed at autopsy as tuberculosis in origin.

I have not observed typical "miliary tuberculosis," but in the usual widely disseminated types the individual lesions were much larger and more conspicuous than the small "tubercles" seen in the miliary tuberculosis cases in England.

Perhaps it is worth noting that tuberculous disease of the kidney as an entity either clinically or post mortem appears to be rare. The kidneys are however, frequently affected in pulmonary disease, but the microscopic appearances are those of a toxic nephritis with, or without, co-existing amyloid changes.

CLINICAL DIFFERENCES NOTED.

The diagnosis in pulmonary tuberculosis is usually very easy for many reasons. Patients do not, as a rule, attend hospital till the disease is well established, and the physical signs, which are well marked, are those of ulcerative phthisis involving both lungs. Fibroid phthisis or the condition known as " healed fibroid phthisis " is not seen. Clubbing of the fingers, a sign which takes a little time to develop is rarely seen. The temperature chart presents the usual appearance of either a sustained irregular type of a swinging pyrexia which is said to be typical. Profuse sweats and rapid emaciation with an unusual frequency of severe haemoptyses, are common features, but anorexia, in my experience, only appears in patients very near death. Oedema of the feet and albuminuria are signs heralding approaching end, which occurs with some suddenness in the asthenic and cachectic patient.

Verification of the clinical diagnosis is a simple matter as tubercle bacilli are abundant in the sputum.

A number of cases have occurred which have clinically simulated unresolved pneumonia. The diagnosis has been helped by the X-ray appearances and sometimes by the finding of tubercle bacilli in the sputum.

Tuberculous pleurisy presents no unusual feature, and the general condition of the patient makes the nature of the process clear. Cytological examination of the fluid and inoculation into guinea-pigs (as done by the Medical Research Institute) leave little room for doubt as to diagnosis. The clinical aspect of tuberculous peritonitis is often that of an uncomplicated ascites, but there may be palpable glandular enlargement or omental thickening. Here again the cytology of the fluid and the results of animal inoculation may have to be relied on for a diagnosis.

Duration of the disease.—It is difficult to be dogmatic about this, but in the more common types the duration is short and a fatal ending is seen about three or four months after the patient first notices symptoms. As mentioned above there are marked differences according to the class of patient and to the general health and mode of living of the individual considered.

Aetiology.—Admittances are, in the majority of cases, young adult males. The infant and female admissions are less. Many female patients however, are seen in the Out-Patient Department, and thus it would appear that the sexes are probably equally affected.

As mentioned previously individuals of the labouring class who come down from the north and suffer from malnutrition whilst in the Colony appear to be the class most liable to the disease. Mohammedans settling in places like Accra seem to be the next most frequent sufferers. At the same time the condition is not uncommon amongst the indigenous coastal tribes especially in the towns.

TREATMENT.

Results are very bad. Various types of recognised treatment have been tried in the hospital with almost uniform failure, especially when the " improved " cases are followed up after they have left hospital.

Recently I have satisfied myself that there is a small percentage of cases which do react to treatment. The rapidly acute and advancing changes have in some patients been observed to slow down and to even become stationary. This has only happened after absolute confinement to bed and careful general treatment. The progress or otherwise can be easily confirmed by X-ray at fairly frequent intervals, if the clinical evidence is not considered a satisfactory guide. It is hoped that some of these patients may prove satisfactory for collapse therapy and give ultimate results that are better than those treated on other lines.

The tuberculous patients are nursed on the verandahs, as far as is possible. They are given the best nourishing food with special diets and "extras" and they get the maximum amount of fresh air and sunshine. Other treatment includes the usual "malt and oil," etc., with supplementary symptomatic treatment.

The indications for complete confinement to bed are of course followed, and in some few apparently favourable cases graduated exercises on the usual lines have been tried. Heliotherapy did not prove a success in perhaps rather favourable conditions, and no definitely pleasing effects have so far been seen after general ultra-violet therapy, in chosen patients.

It is hoped that collapse therapy will be useful in some of the remarkably severe and often fatal haemoptyses which occur, and it is also thought that the more recent methods of gas replacement will further improve the outlook in some cases of tuberculous effusion.

It can be definitely said that surgical aid has enormously helped in many patients with localised and accessible glandular involvement, so that many cures have been possible. Surgery has also been of the utmost value in at least one case of tuberculous peritonitis, and it is confidently hoped that this is only an indication of what may be done in the future. Theracoplasty, has not yet been indicated in any case of pulmonary disease, but may perhaps be of definite value in cases where artificial pneumothorax has been tried and has not been completely successful.

INFECTION.

Special precautions are of course taken with the nursing of tuberculous patients. Cases of pulmonary tuberculosis have occurred among hospital dressers in medical wards, but it is not often possible to say where they were infected. The sputum appears to be the main source of infection, and it is unfortunate that spitting appears to be an important and well practised accomplishment among Africans, as there can be little doubt that the organism is widely disseminated in this way.

The control of spitting in the hospital is of course an easy matter and the disposal of sputum and infected dressings, etc., provides no difficulty.

Overcrowding in dark and badly ventilated houses is no doubt a contributory factor which may explain the frequency among the north country folk.

Milk certainly plays a less important part than at home.

BONE, JOINT AND GLANDULAR TUBERCULOSIS.

The glandular types of infection as met with in the medical wards have already been considered. Practically, the only types of bone tuberculosis that has been met with at all is the spinal type.

The treatment of these is of course a surgical problem and they are invariably treated in the surgical wards, but a point of some interest is the frequency with which paraplegia was the first symptom which caused these patients to seek advice and treatment.

A. J. HAWE,
Medical Officer.

31*st March*, 1929.

APPENDIX D.

BRIEF REPORT ON THE LEPER SETTLEMENT, HO, 1928–29.

This report should be read in conjunction with Dr. F. H. Cooke's report on leprosy published in Appendix C of the Annual Report of the Medical Department for the year 1926–27 and with his second report published at Appendix D of the Annual Report for 1927–28.

On the 31st March, 1928, 95 lepers were on the maintenance roll and classed as inmates and 212 were treated as out-patients. The majority of these out-patients lived in huts erected by themselves in the temporary settlement.

In July, 1928, 75 inmates were transferred to compounds in the permanent settlement and by the end of October a further compound, making four in all, having been completed, another 25 were transferred, and the maintenance roll was increased to the total of 320. Many of the inmates, in the temporary settlement, were encouraged to build temporary huts on the permanent site and move into them as these were erected. On the 31st December all the lepers, other than those housed in the permanent buildings, were residing in temporary huts in the settlement and the old site was then destroyed by fire.

During the month of March, 1929, more money being available, the maintenance roll was increased to 380, but this number will not be maintained during the coming year, 1929–30.

350 is the number that will be placed on maintenance.

At the end of the financial year, the position was as follows :— Inmates 350—out-patients 68, making a total of 418 lepers.

SUMMARY FOR YEAR 1928–29.

Remaining on 31/3/28	95
Admitted during the year 1928–29	372
Discharged Cured	5
Discharged on Parole	117
Died	3
Ran away	17
Re-admitted for further treatment	25
Out-patients	68

HABITAT.

Togoland.	
Ho area	201
Kpando area	250
Gold Coast (Trans-Volta)	69
Gold Coast Colony	13
Ashanti	2

Certain theories have been advanced as to predominance of Leprosy in certain areas.

(1) *Climatic.* A heavy rainfall in any area is supposed to predispose to Leprosy increase. The reason is probably advanced because closer contact between infected persons and others occurs at night as a result of the lower temperature.

(2) *Excessive fish Diet.* As regards (1) I cannot find any difference in the number of lepers in dry or wet areas to support this theory. Avatime is a wet area (rainfall yearly 60–65 inches) 22 lepers came from there. Kpando—moderately wet rainfall (50–55 inches), had 25. Ho, drier, (45–50 inches) had 31, and Abutia, drier still (35–40 inches) and with a smaller population than any of the above, had 14.

(2) *Fish Diet.* The diet of the inland native contains dried fish but meat is consumed as well, and I have not found that fish is consumed in greater quantity than meat in any particular area. From my own observations I consider that the disease is carried by direct contagion, and infection takes place from the nasal discharge of the early stages. But contrary to these observations, husbands may be found to be infected but not wives, and *vice versa* ; in fact, of the inmates, cases where husband and wife are both infected are exceedingly few, only 2% of the total. The solution of the enigma may lie in the fact that we are ignorant of the length of the incubation period of leprosy and therefore cannot come to definite conclusions.

Types: Anæsthetic, Nodular, and Mixed occur, the first predominating (about 68%). Many cases come to the dispensaries with large patches—leprous in appearance—on the back or arms and sometimes on the face. These patches are very deceptive and at first glance appear to be definitely due to leprosy, but there is no nerve degeneration to account for the extensive skin lesions, and no peripheral neuritis or anæsthesia. They are probably fungoid patches and react to treatment. At first I was somewhat perplexed by these patches but now I never accept a skin lesion of any extent as leprosy unless there are nerve symptoms to support the diagnosis.

The complications that occur such as, Iritis, Ulcers of the Cornea, Stomatitis, Stricture of the Larnyx, I have found only in Nodular or Tubercular cases.

Apart from nerve lesions and perforating ulcers of foot, there are no other complications met with in the Anæsthetic type. Tubercular disease or probably more correctly leprous disease of the lungs occurs in both types and is quickly fatal, all three deaths were due to this complication.

Treatment and Results. Subcutaneous injections twice weekly, of Alepol starting with 3 cc and after three months increased to 5 cc, is the treatment I adopt, together with 30 grains of Potassium Iodide daily.

I am waiting until the Hospital is erected before starting the extensive Potassium Iodide treatment as recommended by Dr. Muir. After observing Alepol treatment for over a year, I can say that the results warrant all the favourable reports on this drug published. The first result noticed, and this is fairly early, is the gradual lessening of the neuralgic pains—many patients who found great difficulty in walking and using their hands, are now able to do a good day's work on the farms, and the patches are gradually disappearing. Five cases are definitely cured ; these were in the early stage, and 92 are discharged on parole apparently cured. These cases report to me, either at Ho or at one of the village dispensaries I visit, monthly. For the year 1928--29, 177 were so discharged but 25 have returned for further treatment, the recurrence of the disease being of the nerve type.

Occupation of patients. Farming is in full swing ; a large area is being planted out in yams, cassava, corn, ground nuts and shallots. Carpenters are put on to making tables, chairs, etc., and to assist in building the offices and the hospital. Masons assist in erecting buildings ; weavers, of whom there are 5, are kept busy ; yarn is supplied to them and the cloths they make, after being disinfected will be sold, the proceeds, after deducting the cost of materials, will go to a general fund for the benefit of the settlement, together with the proceeds from the farms.

Water Supply. As the well has not functioned although it had been deepened to over 30 feet, a reinforced concrete tank to hold 12,500 gallons was made and is now in use.

Buildings. At the end of the year, four compounds were completed and occupied. A stone building comprising Office, Store, Dispensary and Injection Shed was finished and is now in use. Another compound was almost finished ; whitewash is all that is necessary to complete it and foundations for another compound are laid.

F. H. COOKE,
Medical Officer.

31*st March,* 1929.

APPENDIX E.

NAVRONGO, N.TS.,
1ST APRIL, 1929.

Report on Leprosy by the Medical Secretary to the Gold Coast Branch of the British Empire Leprosy Relief Association.

I have to forward an annual report of Leprosy work done during the year April, 1928 to April, 1929.

2. The work has been carried out on a pre-arranged plan as far as possible, the chief points of which have been as follows :—

- (*a*) To carry out an extensive Leprosy Survey of parts of the Colony.
- (*b*) The formation of Leper Out-Patient clinics, at all stations where there are Medical Officers resident.
- (*c*) To disseminate as much as possible information concerning leprosy.
- (*d*) To visit existing settlements, with a view to their expansion and opening up of out-patient clinics in connection with them.

3. Early in May circulars were sent out to all Medical Officers, briefly informing them of the main points of the latest treatment, and inviting their co-operation in noting any cases they might come across during the course of their duties, thus helping in the general survey of the

Colony. In September, on the arrival of Dr. Muir's booklet, a further circular was sent round with the booklet, stating that supplies of the necessary drugs were available on application, and hoping that out-patient clinics might be started.

" Leprosy Notes " have been sent to all stations quarterly, and other literature as received.

4. During the latter half of April and the month of May, a survey was done in the Ho District, with the assistance of the Medical Officer Dr. Cooke.

An investigation was also made into the cases in the Ho Leper Settlement. The chief facts that emerged from this visit were :—

(*a*) The leprosy incidence appears to be in this district about seven per mille.

(*b*) The anaesthetic type predominates, as opposed to the nodular type of the disease.
82% of the former to 18% of the latter, in a series of 444 patients. This is similar to recent experience in Southern Nigeria.

(*c*) Patients come in entirely voluntary and in spite of this fact there are far more applicants than can be accommodated ; as a consequence the original scheme has had to be considerably augmented, and it is hoped that by the end of the present year, there will be accommodation for over 300 patients.

(*d*) The new settlement is being run on the most recent lines, provision having been made for farming, and various crafts, such as carpentry, wood carving, weaving, basket-making and it is hoped to have other industries started before long.

(*e*) Treatment is being carried out by means of Potassium Iodide therapy and the injection of Alepol. Since the commencement of the work in May, 1926, 84 patients have been discharged as non-infectious, six of these were clinically free of the disease, the remainder being of the " Burnt out " type. In these cases the symptoms were relieved, and the discharges had ceased.

(*f*) There is no doubt that this method of voluntary treatment and segregation has proved a great success, as compared with the old German compulsory methods.

5. Early in June, on the instruction of the Hon. Director of Medical and Sanitary Service, I visited and reported on the Accra Leper settlement. This settlement is of a more temporary nature than the settlement at Ho, being part of the Contagious Diseases Hospital, the buildings being of wood and corrugated iron. It is situated one mile to the east of Christiansborg on the Labadi road.

Facts noted here were that :—

(*a*) The Anaesthetic type of the disease was not so prominent as at Ho (56% anaesthetic and 44% nodular). This I attributed to the fact that the settlement is more in the nature of a segregation ground for bad cases met with round Accra, many of the patients not even being Gold Coast natives, and the majority were well marked advanced cases of the disease with complications.

(*b*) As suitable farming land in this vicinity is limited, there are not the same facilities for keeping the inmates employed in various occupations and so the air of cheerfulness that is present at Ho is not so marked.

(*c*) There is an out-patient clinic in connection with the settlement, open once or twice weekly, and this attracts a certain number of patients from Accra.

(*d*) Whether this should be enlarged or not is open to discussion, owing to the lack of land near, and the higher cost of living near Accra.

It is hoped that in time the Out-patient clinic will become more widely known and utilised and thus help towards the eradication of the disease. The suitability of the site is doubtful, if it were proposed to form a large Settlement similar to the one at Ho.

6. After leaving Accra early in June, I proceeded to Lawra to take over the Travelling Dispensary there. On the journey I had the opportunity of discussing this problem with several medical officers.

At Kumasi, leprosy work is carried on by the Medical Officer of Health, who had at that time 18 cases attending weekly for treatment ; this number has considerably increased recently.

At Kintampo, Dr. MacPherson has been treating some lepers as out-patients, he has been supplied with a further supply of drugs, and, I understand, the number of patients applying for treatment is increasing.

Dr. G. F. T. Saunders had carried out a survey in this district while on tours, and had found 15 cases, mostly in the Banda division, three being in the town of Kintampo.

At Bole and Wa, Dr. Macgregor had carried out extensive survey work, and had listed over 200 cases that he had seen during the course of his last tour : 18 of these were in Bole, and the remainder in the Wa district ; a very helpful piece of work, showing the value of a prolonged residence in one place.

At Lawra, while with the Travelling Dispensary I saw 14 lepers, among the 930 patients treated, 12 of these were old " burnt out " cases, and three early anaesthetic cases, the patients being drawn from round the town of Lawra and the part of the district to the north of Lawra.

Unfortunately my work was cut short by a month in Hospital in Accra and Kumasi.

Even from this brief survey it appears that leprosy is very prevalent in the Northern Territories.

7. In August, September and October, I was at Ho. During this period, I had another opportunity of examining the lepers there, and watching the progress of the new leper settlement, which was then being occupied, as buildings were made for occupation.

It was noticeable how much more cheerful and contented the occupants were in their new surroundings. Farming, carpentry, and the other industries already described were taken up with zest, and there was more ample room for expansion.

The atmosphere thus created cannot fail to react on the patients and assist in the treatment, especially in such a prolonged and somewhat painful treatment as that of leprosy is.

Yaws being so universal in its chronic form, Bismuth was given to all on four occasions. It was interesting to note that it caused a reaction in many of the cases, more marked than that due to Potassium Iodide, and also more difficult to control.

It would be very helpful if a general routine examination of Blood and Stools could be carried out on all patients and also the Sachs-Georgi or Wassermann reaction, with the help of the Pathology Branch. These tests were carried out at Itu in Nigeria by the Pathological Department in Nigeria, and is described in the " Transactions of the

Royal Society of Tropical Medicine and Hygiene, Vol. XXII, No. 3, November, 1928." The other examinations there enumerated could be carried out at the same time.

Lepers are still coming in in increasing numbers from all over the Ho district, proving the popularity of voluntary segregation. Early cases which would never be seen under a system of compulsory segregation present themselves willingly for treatment.

8. November, December, and the first half of January were spent in carrying out a survey in part of the Central Province, chiefly in the Cape Coast district, my headquarters being Elmina.

Work was carried out at the Elmina Dispensary on two days in each week. The remainder of the time being spent on trek throughout the district. Twifu, Prasu and Foso areas were visited, patients of all types being seen on trek and at Elmina.

40 lepers in all were seen, 16 males and 10 females. 34 of these were anaesthetic in type, and only six nodular, again showing over 80% of the anaesthetic type.

It is difficult to account for the paucity of lepers seen, nearly 600 cases of other diseases being seen on trek.

It may be that the Fantis being intelligent realise the dangers of infection and isolate the cases in the bush.

Six of these 40 cases were emigrants from the Northern Territories, who had been working in the mines and state that they developed the disease before reaching this district.

A visit was made to Sekondi and the Medical Officers and various missionaries interviewed. It appeared that few lepers were seen in Sekondi. Occasionally one appears in the Prison or at the Hospital but this is not very often.

The Medical Officers at Sekondi and Takoradi intend to be on the alert for lepers, and to treat any that may present themselves as out-patients thus starting an out-patient clinic.

9. The latter part of January and part of February was spent in preparing a second Travelling Dispensary and on local leave.

10. At the end of February, the Travelling Dispensary was taken to Kumasi by road, and thence to Lake Bosumtwi Rest House above the village of Abonu.

11. The Dispensary was prepared, and ready for work on the 7th, and work continued daily except Sundays till the 29th of March.

During this period 2,097 new patients were seen and treated, and the return visits amounted to between 1,400 and 1,500, of whom 63 were lepers.

Yaws appeared to be the common predisposing cause in some instances through the fissures of Clavus.

Starvation and lack of food appear to play no part at all in lowering the resistance though semi decomposing fish is commonly eaten.

50 of these cases were of the anaesthetic type as opposed to 13 nodular cases, namely 79% as opposed to 21%.

There is no doubt that the leprosy incidence is high in this area, though whether it is higher than in other parts of Ashanti it is difficult to say.

It is certainly higher than in other areas further south as in the Cape Coast district.

These cases came for the greater part from the shores of the lake, though some came from villages some miles away to which treks had been made.

These cases have been directed to go to Bekwai for further treatment, as the Medical Officer there has arranged to start an out-patient clinic for lepers.

12. Though the Survey is far from complete, there are some facts that emerge from investigations conducted so far.

(*a*) The Anaesthetic type of leprosy appears to be predominant, the " Maculo-anaesthetic " type of text books. The Nodular is much rarer. This is similar to experience in the Congo and Southern Nigeria.

(*b*) Yaws and Scabies are two predisposing causes which are extremely common, the former perhaps acts by lowering the general resistance, and the latter by giving to the invading organism a foothold in the skin. In the Northern Territories the latter is the most prominent as it is almost universal.

(*c*) Starvation may play a part in predisposing to the disease in the Northern Territories though not in the Colony, further south.

(*d*) Semi decomposing fish is eaten, almost universally when obtainable, especially near the Coast, and this may cause an auto-intoxication which lowers the resistance.

(*e*) The shortage of water in some areas, as in certain parts of Togoland and in the Northern Territories, predisposes to dirt diseases such as scabies and tineae, which open up channels for invasion.

(*f*) The initial lesion of the disease varies slightly in different areas. The face seems to be a very common site of entry in women, though any parts exposed to pressure against clothes, as the extensor surfaces, and the back and buttocks, are susceptible. Some cases seem to be infected through an old standing clavus (foot-yaws).

(*g*) In some areas precautions appear to be employed against infection, though this is by no means general.

(*h*) If one may judge from experience in other parts of the world, it may be stated with some confidence that the method of voluntary segregation in settlements, where modern methods of treatment can be employed, will be found more suitable than any compulsory methods, which will only lead to the hiding of cases, till the disease is past the most remedial stage.

(*i*) Leper out-patient clinics exist at present at Ho, Accra, Kumasi, Elmina, Kintampo, Yendi and Zuarungu. They may soon be started at Sekondi and Takoradi.

It is hoped that more will be started in the near future in other centres.

(*j*) In regard to the survey work, the best method appears to be to stop in one centre for at least two or three months, and to work and trek to other places round it on certain days. Confidence is probably better gained when there is some place where people know they can always see the Medical Officer, than when he is moving from Rest House to Rest House and is away for several days at a time.

(*k*) From experience at Navrongo in the north, where 10 fresh cases on an average of leprosy were seen daily, all with scabies, and many cases were seen in each village, it is possible that insufficient food and water play a more important part than in the south and render it therefore unlikely, that anything much can be done in this area till the standard of health and resistance to diseases generally can be raised.

M. B. DUNCAN DIXEY,

Medical Secretary, Gold Coast Branch,
British Empire Leprosy Relief Association.

APPENDIX F.

ON THE USE OF BISMUTH AND ARSENIC COMPOUNDS IN THE TREATMENT OF YAWS AND SYPHILIS.

The Colonial Medical Research Committee desired that a record should be made by all Medical Officers of their experiences in the use of Bismuth and Arsenic in the treatment of yaws and syphilis.

A summary of the opinions furnished is as follows :—

1. Bismuth preparations are of immense value in the treatment of yaws, but Novarsenobillon is the drug of choice.
2. They are cheap, comparatively easily administered by a skilled officer, and with care local and general reactions are uncommon.
3. Skin lesions heal rapidly and patients are rendered non-infective very early. This is a great advantage. Toxic effects can be easily combated by Sodium Thiosulphate.
4. Stomatitis is a common complication but it responds readily to treatment.
5. Sodium Bismuth Tartrate intramuscularly was the salt most commonly used and where metallic bismuth or other salts of bismuth were employed little advantage was noticeable. (It should be remarked that the latter finding was that of one Medical Officer only).
6. All agreed that N.A.B. and similar arsenicals were much superior to Bismuth in Yaws, and that at least eight to 12 weekly injections of Bismuth were needed to produce freedom from symptoms for any length of time in the secondary stage.
7. Some observers held that Bismuth alone is insufficient to cure yaws and that prolonged combined treatment with Bismuth and Arsenicals is required to achieve cure.
8. N.A.B. intravenously is painless and patients tend to continue treatment longer under this method than when Bismuth is used.
9. Its great disadvantage is its high cost.
10. Toxic effects are not common—possibly owing to the fact that treatment is not sufficiently continuous—but are severe if they do occur. Sodium Thiosulphate is exceedingly valuable in treatment of toxic effects.

11. Bismuth alone for Syphilis cannot be relied on but good results are obtained when combined with Arsenicals.
12. One observer was of opinion that in yaws small doses of either metal given regularly over a long period were more effective than treatment with larger doses given over a shorter period.
13. All Medical Officers agreed on the immense difficulty of distinguishing tertiary yaws from tertiary syphilis clinically and no test other than clinical appearances could be relied on or was tried to distinguish the secondary stages of the two diseases.

The report of the Yaws Clinic at the Gold Coast Hospital which has been in charge of Dr. A. J. Hawe, Medical Officer, is given in the next Appendix, together with the letter of Dr. A. J. R. O'Brien, C.M.G., Resident Medical Officer, forwarding the report.

APPENDIX G.

GOLD COAST HOSPITAL,
ACCRA,
1st April, 1929.

I forward you the report of the Yaws Clinic at the Gold Coast Hospital.

This Clinic is in charge of Dr. Hawe who has taken a great interest in it and kept most careful records.

The Clinic is entirely free and many patients come from a distance. It has been found an advantage to give separate afternoons to males and females.

Of the 550 patients treated during the year 1928–29, only 81 completed three courses of treatment. Many cease to come when their symptoms disappear.

Every patient has a Wassermann test made at the beginning which is repeated after each course of five injections.

My experience of yaws, which is considerable, is that the treatment should be as prolonged as that in syphilis.

The symptoms rapidly disappear with a few injections but the disease soon manifests itself again if not thoroughly treated.

The treatment with N.A.B. is by far the easier and more pleasant for the patient. We have taken X-ray photographs which show bismuth to be present in the buttocks a year after injections have been given.

I think, in the future it would be better to combine bismuth and N.A.B. in the treatment of Yaws as we do in Syphilis.

I know, and all my staff agree on this, of no other way of differentiating the diagnosis of Yaws and Syphilis than by history and clinical observation.

A. J. R. O'BRIEN,
Resident Medical Officer.

THE TREATMENT OF YAWS WITH SOLUBLE BISMUTH.

A soluble bismuth salt was used, i.e., a solution of Sodium Bismuth Tartrate (" Sobita "). This was made up to the strength of one grain in 1 cc of distilled water. After a preliminary Wassermann Reaction test a course of ten grains was given intramuscularly and the Wassermann Reaction repeated. A second course followed the first if the patients presented themselves for further treatment, and in some cases it was possible to give a third course.

The following briefly summarises the results obtained, comparing the effect of the above treatment with the results obtained with Novarsenobillon which was used for the treatment of the same disease in the wards.

EFFECT OF BISMUTH IN SECONDARY YAWS.

This disease responds satisfactorily to Bismuth, and the results of the administration of this drug in the florid stages of the disease were good. The rash disappeared after about 3 grains in infants and children, and after about 6 grains in adults. Whether the cure is complete is very doubtful, as cases do not return for further observation when the rash has disappeared.

No cases of " primary " yaws were observed, but good results were obtained in the cases presenting the " furfuraceous desquamation " which precedes the true secondary rash.

BISMUTH IN TERTIARY YAWS.

Although the results are poor, there is undoubted relief of the bone and joint pains. Objective symptoms such as hyperkeratosis, periosteal lesions and adenitis are not noticeably improved. The Wassermann Reaction is often favourably influenced with a " course " of bismuth. In a few cases where the Wassermann Reaction showed an improvement after a course of 10 grains, the change did not appear to be permanent.

A small percentage of cases developed bismuth stomatitis.

It was noted that the bismuth salt remained locally in the buttock for very long periods of time and occasionally gave rise to abscess formation.

That the soluble bismuth is not readily absorbed is easily shown by X-ray which has demonstrated the metal locally in the tissues months after the last injection.

The actual Wassermann Reaction results for those cases who underwent a full course of treatment are tabulated on the attached sheet.

NOVARSENOBILLON IN THE TREATMENT OF YAWS.

The results obtained with N.A.B. were very successful in the treatment of secondary yaws. The curative effect is more rapid than that produced by bismuth, and there is no doubt that the intravenous route is far less painful. It is not possible to say that a cure is complete after a single course of N.A.B., as the patients do not appear after the rash has gone, but the consensus of opinion is that there is much less likelihood of a recurrence after arsenical medication than after the bismuth treatment.

TERTIARY YAWS.

Here again the results obtained were superior to those from Bismuth. The pains were rapidly lessened, and the objective symptoms were favourably affected. The improvement in the periosteal lesions was easily confirmed by X-ray examination. Ulceration of the leg, which is often associated with tertiary yaws, rapidly responded to the drug. The clinical manifestation of Yaws known as "Gangosa" always showed the most dramatic and gratifying results with N.A.B.

BISMUTH PREPARATIONS IN THE TREATMENT OF SYPHILIS.

Bismuth has only been used in conjunction with arsenic and mercury in the treatment of syphilis and I am unable to express any opinion as to the potency of this drug when used alone.

THE WASSERMANN RESULTS OBTAINED IN THE YAWS CLINIC AFTER THE ADMINISTRATION OF INTRAMUSCULAR BISMUTH SODIUM TARTRATE.

(IN TERTIARY YAWS.)

No. of Case.	W.R. before.	After 10 grains.	After 20 grains.
1	Double plus	*Single plus*	
12	Double plus	Double plus	
14	Double plus	Double plus	
17	Single plus	Single plus	*Negative.*
18	Double plus	Double plus	Double plus.
36*a*	Double plus	Double plus	
42	Double plus	*Negative* (stomatitis)	
47	Double plus	*Single plus*	
49	Double plus	Double plus	
58	Double plus	Double plus	
67	Double plus	Double plus	
78	Double plus	*Single plus*	
85	Single plus	Single plus	
93	Double plus	Double plus	
104	Double plus	Double plus	
113	Double plus	Double plus	
118	Double plus	Double plus	
137	Single plus	Single plus	
142	Single plus	Double plus	
150	Double plus	Double plus	Double plus.
156	Double plus	*Negative*	
166	Double plus	S.G. 4/6	
†168	Double plus	Single plus	Double plus.
169	Double plus	*Single plus*	
†*170	Double plus	Single plus	Single plus.
172	Double plus	Double plus	
179	Double plus	*Single plus*	
180	Double plus	Single plus	
184	Double plus	S.G. 4/6	Double plus.
189	Double plus	Double plus	
193	Double plus	S.G. 5/6	
198	Double plus	Double plus	
207	Double plus	Double plus	
208	Double plus	Double plus	
209	Double plus	*Negative*	
213	Double plus	Double plus	
216	Double plus	Double plus	
218	Single plus	Double plus	
220	Double plus	Double plus	
225	Double plus	Double plus	
239	Single plus	Double plus	
***240	Negative	Single plus	
242	Single plus	*Negative*	
243	S.G. 6/6	Double plus	
244	Double plus	*Single plus*	
250	Double plus	*Negative*	
252	**S.G. 5/6	Double plus	
255	S.G. 6/6	Double plus	
256	Weak positive	Single plus	*Negative.*
271	Double plus	Double plus	
272	Double plus	*Single plus*	
273	Double plus	*Single plus*	
275	Double plus	Double plus	Double plus.
278	Double plus	Double plus	Double plus.

NOTE: *S.G.=Sachs Georgi reaction. The numbers are expressed as a fraction e.g., Sachs Georgi "four six" is expressed S.G. 4/6.

†*No. 170. Received a fourth course, and at the termination of this the blood Wassermann was again a "double plus."

***No. 240. Even though the initial W.R. was negative, this patient had definite symptoms suggesting tertiary yaws and was given treatment.

No. of Case.	W.R. before.	After 10 grains.	After 20 grains.
280	Double plus	*Weak positive*	
294	Single plus	Single plus	
296	Double plus	Double plus	
298	Double plus	*Single plus*	
299	Double plus	*Single plus*	
303	Double plus	*Single plus*	
304	Double plus	Double plus	
305	Double plus	Double plus	
306	Double plus	Double plus	
307	Double plus	Double plus	
317	Double plus	*Weak positive*	
318	Double plus	Double plus	
325	Double plus	Double plus	
334	Single plus	*Negative*	
341	Single plus	Single plus	
343	Double plus	S.G. 5/6	
345	Single plus	*Negative*	
348	Double plus	S.G 1/6	S.G. negative.
353	S.G. 2/6	S.G. negative	
359	Double plus	*Single plus*	
364	Double plus	S.G. 1/6	
369	Double plus	S.G. 3/6	
375	Double plus	*Single plus*	
390	Single plus	Double plus	
†411	Double plus	*Negative*	*Double plus.*
422	Single plus	Single plus	
435	Single plus	Single plus	

All the above cases were cases of Tertiary Yaws. Only those cases which received at least a full course of 10 grains with a W.R. when this course was completed are considered. The majority of the cases did not attend for a sufficiently long period for this to be done.

Above results expressed in a percentage show :—

Total of 81 cases :

67.9% No change in Blood Wassermann.
32.1% Improvement in Blood reaction.
3.7% Single plus changed to Negative.
4.9% Double plus changed to Negative.

That the blood changes are not permanent is seen by result of W.R. in cases No. 411, No. 168 and No. 170.

THE DIFFERENTIATION OF YAWS AND SYPHILIS.

This is as yet a matter of personal opinion and the following are merely my own views on this question. These have received a certain amount of support from P.M. observations, and I have had satisfactory results in the wards when they are used as a basis for treatment.

It is only necessary to consider tertiary yaws and tertiary syphilis. There are certain manifestations of tertiary syphilis which when seen are enough to establish the diagnosis of this disease in contradistinction to yaws. For the most part they are clinical manifestations, but their confirmation may require the aid of the laboratory. These will now be mentioned :—

I consider the following to be sufficient to establish the presence of syphilis.

(1) *Involvement of the central nervous system.*

- (*a*) Syphilitic-like changes shown by clinical examination with the presence of pleocytosis, increased protein and a positive W.R. in the Cerebro Spinal Fluid.
- (*b*) The above changes in the spinal fluid even if unaccompanied by objective clinical changes in the nervous system.
- (*c*) The occurrence of such conditions as cerebral thrombosis and hemiplegias in young adults without such obvious causes as embolism, trauma, renal diseases, etc.
- (*d*) Optic strophy or disseminated chorioditis when associated with some other syphilitic-like sign such as a positive blood Wassermann.

(2) *Involvement of the cardiovascular system.*

- (*a*) Aortic aneurism, or aneurism of the larger vessels in a young adult, when there is no obvious aetiological factor such as trauma.
- (*b*) Aortic regurgitation and definite aortitis. (There is no rheumatic factor in the Colony) cases of aortic incompetence which are accompanied by hypertension and chronic interstitial nephritis must, of course, be cautiously considered. A syphilitic aortitis can be demonstrated P.M. in many cases of Aortic valvular disease.

(3) Involvement of the viscera, such as the liver and spleen, by a syphilitic-like process which responds to specific treatment, and which is not accounted for by some other factor. In this group there are cases of hepatic cirrhosis which respond quickly and completely to such drugs as mercury and iodides.

The view that yaws never affect the central nervous system which is widely held, but I believe as yet unconfirmed, might easily be verified by observations on the spinal fluid of cases of uncomplicated secondary yaws. A definite change in the cells, protein or W.R. in these fluids would make the above view untenable.

A. J. HAWE,
Medical Officer.

31*st* *March,* 1929.

(NOTE ON DR. HAWE'S SUGGESTION).

This is a very important suggestion and would repay careful investigation on the points raised.

The patients on whom observations are to be made should be selected very carefully.

The following points would need be kept in view in the selection of cases :—

(1) The individual should be well below the age of puberty. This would probably exclude acquired syphilis.

(2) The parents of the patient should be examined for syphilis in order to exclude syphilis in the child and the individual should show no signs of congenital or acquired syphilis.

Observations should then be made on a very large number of cases for the reasons that Wassermann Reactions, protein content results and cell counts are variable factors in syphilis and the same might be expected in yaws. To explain further :—

(1) The Wassermann Reaction of the cerebro-spinal fluid is not always positive even in syphilis. Fildes, Parnell and Maitland in a series of 1,314 cases of primary, secondary, latent and early tertiary cases of syphilis obtained the following results :—In 144 cases of primary syphilis, before the Wassermann of the blood serum had become positive, no positive Wassermann Reactions with the cerebro-spinal fluid were obtained whereas of 371 primary cases with positive serum tests, twelve gave positive Wassermann Reactions with the cerebro-spinal fluid. Out of 512 cases of acute

or recent secondary syphilis, including a few early tertiary lesions, thirty-five gave positive results and in 287 cases of late secondary, latent and tertiary lesions, fifty-three positive Wassermann Reactions with the cerebro-spinal fluid were obtained.

It must also be remembered that the Wassermann Reaction of the cerebro-spinal fluid may be positive in conditions other than syphilis, e.g. brain tumours. Lotmar suggested that this might be due to the entrance into the cerebro-spinal fluid of lipoid substances.

(2) While pleocytosis is present in a large percentage of cases of syphilis of the central nervous system it is by no means confined to this disease.

(3) Syphilitic affections of the nervous system are practically always associated with an increased protein content of the cerebro-spinal fluid, but in alcoholic dementia, progressive senile dementia, chronic epilepsy, etc., this condition is also found.

APPENDIX H.

REPORT OF THE MATERNITY HOSPITAL, ACCRA,

1928–29.

The Maternity Hospital was officially opened by His Excellency the Acting Governor, Mr. T. S. Thomas, on May 19, 1928.

It contains two wards with six beds each, two single wards and an isolation ward, making a total of fifteen beds. Since its opening four extra beds have been put up on the balconies to provide for the increasing number of patients seeking admission, making now a total of nineteen beds and fourteen cots.

As well as the wards there is an Out-patient examination and Consulting Room, a Lecture room, a Theatre and a Clinical Room.

The work of the Maternity Hospital may be divided into three different sections :—

I. Out-patient Work.
II. In-Patient Work.
III. Training of Nurse-Midwives and of Health Visitors.

I. OUT-PATIENT WORK.

Two Ante-natal Clinics and one Post-natal Clinic are held weekly at the Hospital. The medical officer has also held an extra Ante-natal Clinic at both the Christiansborg and the Princess Marie Louise Welfare Clinics, in order to link up the maternity work of the town with the maternity Hospital from its beginning.

A steady increase in numbers has been made each month as follows :—

	May and June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total.
Antenatal (New cases)	96	61	51	61	65	88	106	116	82	109	835
Antenatal (Old cases)	105	87	94	120	150	165	233	316	317	389	1,976
Postnatal (New cases)	14	9	13	14	35	29	29	33	34	38	248
Postnatal (Old cases)	15	9	23	31	64	51	55	90	99	103	540
Total	230	166	181	226	314	333	423	555	532	639	3,599

The Ante-natal Clinic has been the chief source of the increasing number of normal cases now being admitted to hospital for their confinements.

The chief complications of pregnancy found amongst them have been albuminuria and anæmia. Pelvic measurements are all considerably smaller than in European women, and a different standard has to be taken when estimating pelvic contraction.

Miscarriages are frequent, and the careful taking of the history of all ante-natal patients substantiates the fact of the high rate of still-births and of infant mortality.

The blood of 269 patients has been examined at the Research Institute by the Wassermann or the Sachs-Georgi method. The results were :—

Negative	191
Strong Positive	50
Weak Positive	28

Positive cases in which there is a history of miscarriages or still-births have been receiving an ante-natal course of N.A.B. injection, and results are just being seen, three of these women in the last fortnight having given birth to healthy living children, having had still-births or miscarriages previously.

The Post-natal Clinic is the first of its kind to be held in this district—the mothers with their infants attending not because they are sick but to be kept in health.

All mothers who have attended the Ante-natal Clinic or who have been delivered in Hospital are allowed to attend regularly for one year for advice, weighing of infants and simple treatment.

The chief disorders found are thrush which is very common, and may be due to the pernicious habit of the mother sucking the nipple before feeding her infant), irregular feeding, and constipation.

Very few cases of Ophthalmia Neonatorum have been seen.

II. IN-PATIENTS.

The first patient was admitted to the Maternity Hospital on May 28, 1928. At first the patients were mainly abnormal cases brought in late in labour but the first normal delivery was on June 17, 1928. Since then there has been an encouraging increase of normal cases and the number of beds has now become inadequate.

The numbers of cases admitted and of deliveries have been as follows :—

Total In-patient Admissions	183
Admitted for ante-natal treatment	55
Labour Cases	109
Admitted for Post-natal complications ..	12
Infants	7
Total Number of Deliveries	105
Total Number of Infants born (Including six pairs of twins)	107
Living Infants	82
Still-births	25
Abortions	4

A. Admitted for Ante-natal Treatment.

The following table gives details of the 55 cases of complicated pregnancy admitted for treatment.

Albuminuria	10
General Debility	4
Cystitis	4
Malaria	3
False Pains	3
Ante partum Hæmorrhage	3
Threatened Abortion	3
Splenomegaly	3
Anæmia	3
Pyrexia	2
Vaginal Ulceration	2
Hæmorrhoids	2
Vomiting of Pregnancy	2
Pleurisy	1
Helminthiasis	1
Pseudo-cyesis	1
Gonorrhœal Arthritis	1
Enteritis	1
History of frequent Still-births	1
Hydatidiform Mole	1
Cerebral condition	1
Acute illness (undiagnosed)	1
Nephritis	1
Constipation	1
	55

Of these albuminuria is the most common, and is a frequent cause of prematurity and still-birth.

B. Labour Cases.

Of the 105 deliveries 60 were normal and 45 abnormal.

The presentations were as follows :—

Vertex 99.

V. LOA	42
V. ROA	37
V. LOP	2
V. ROP	3
Unclassified	15

Breech 5.

L.S.A. (extended)	1
R.S.A. (extended)	1
One of twins	3

Face 1. Persistent Mento-Posterior.

Transverse 2.

Impacted shoulder with prolapsed arm and cord	1
Second of twins with prolapsed arm	1

Twins. There were six pairs of twins born, the presentation being as follows :—

Vertex	living.
Vertex	living.
Vertex	living.
Vertex	living.
V. LOA.	living.
V. ROA.	living.
Vertex	living
Vertex	SB. (still-born).
V. LOA.	living.
Breech	living.
Extended breech (half born on admission)	SB.
V. ROP	SB.

There were also two cases of twins with one twin already born before admission, and a case of locked twins in which the mother was admitted moribund and died shortly after admission before delivery.

Quadruplets. One case was admitted immediately after the birth of the infants. Two were SB., one died on the way to hospital, and the fourth lived for three days.

They each weighed 3¼ lbs. There were three placentæ, two of them being joined.

Hydrocephalus. One case.

Prolapsed Cord. Two cases.

Still-births. Still-births and dead births are classed together, the cases as far as can be ascertained being as follows :—

Prematurity due to Albuminuria	2
Prematurity due to splenomegaly and anæmia	1
Premature twin	3
Hydrocephalus	1
Craniotomy (child already dead in each case)	4
Eclampsia	1
Syphilis	1
Delayed labour due to transverse presentation	1
Prolapsed Cord	1
Extended Breech	2
Forceps deliveries for Contracted Pelvis	5
Antepartum hæmorrhage	1
Delayed labour due to Contracted Pelvis (Placental blood full of Malarial Parasites also)	1
Cause unknown	1

Infant Deaths. Nine infants died during the year.

The following table gives the cause of death—

Prematurity	6
Enteritis	1
Congenital Debility	2

Maternal Deaths. There were 11 maternal deaths in the hospital, of these only three were delivery cases.

No. 9. Acute Dilatation of Stomach the third day after forceps delivery for obstructed labour due to Contracted Pelvis.

No. 3. Sudden death three days after spontaneous delivery due to acute anæmia.

No. 125. Sudden cardiac failure two hours after spontaneous delivery.

Three cases were admitted moribund in obstructed labour and died before delivery.

No. 163. Case of locked twins. Patient gravely anæmic and had two fits (?Eclamptic). Brought in moribund and died 10 minutes after admission before delivery.

No. 151. Brought in moribund having been in labour four days. Obstructed labour due to unreduced posterior presentation. Died before delivery possible.

No number, Ruptured Uterus. Native Medicine. Died immediately on admission.

No. 99. Admitted nine months pregnant. Died of acute illness six hours later.

Four had been delivered before admission

No. 11. Delivered 36 hours before admission. Post-Partum Hæmorrhage before admission due to morbidly adherent placenta. Manual removal but died from shock and hæmorrhage.

No. 42. Plancenta Previa already delivered before admission. Admitted blanched and collapsed.

No. 110. Post Partum Hæmorrhage before admission due to retained placenta.

No. 115. Admitted 12 hours after delivery acutely ill.

P.M. (?) Eclamptic Toxæmia.

The maternal mortality in these cases is mainly due to mismanaged pregnancies and labours before admission. The cases of obstructed labour seen after they have been in the hands of untrained native midwives are pitiable and often beyond assistance.

Although there is unfortunately always a certain unavoidable maternal mortality (in England about four per 1,000) the majority of cases dying in child-birth here are preventable deaths, due to ignorance and harmful practices.

Maternal Morbidity. There have been 25 cases reckoned as morbid according to the British Medical Association standard of morbidity.

The causes were as follows :—

Sapræmia	5
Cystitis	3
Breast affections	3
Malaria	3
Parametritis	2
Dysentery	2
Anæmia and Splenomegaly	1
Acute Anæmia of Pregnancy	1
Septicæmia	1
Unaccounted for	3

There has only been one case of septicæmia and no cases have been lost from sepsis which is encouraging as the number of cases which come in already septic is high. The success with these cases may be partly due to the intrauterine sterile glycerine treatment (Remington Hobbs method) which has been used largely.

OBSTETRICAL OPERATIONS.

Operation.	Case No.	Indication.
13 Forceps Delivery	9.15.37.134	Contracted Pelvis.
	1.106	Contracted Pelvis with fits.
	4	Maternal exhaustion due to anaemia.
	112	Maternal exhaustion with fits.
	36	Vaginal Prolapse.
	45	Antepartum Haemorrhage.
	64	Delayed labour due to nipped cervix.
	156	After normal rotation for unreduced occipito-posterior.
	156	Posterior presentation 2nd of twins.
2 Internal Version	2,27	Transverse presentations with prolapsed arm.
4 Normal removal of Placenta	11.35.110.30	
4 Craniotomy	56	Unreduced Posterior and prolapsed Cord.
	118	Persistent Mento-Posterior.
	124	Hydrocephalus.
	116	Contracted Pelvis.
3 Digital Evacuation of Uterus	143.168.182	
1 Repair of perineum	127	
1 Drainage of pelvic abscess	134	
1 Induction with bougies	44	
1 Caesarem Section	158	Contracted Pelvis.

A large number of intrauterine sterile glycerine treatments (Remington Hobbs) were also given without anæsthetic.

III. TRAINING OF NURSE MIDWIVES AND HEALTH VISITORS.

Nine nurses are in training for their Midwifery Certificates, the examination for which is to be made as near as possible to the Standard required for the Central Midwives Board.

Three Health Visitors have also been attached to the hospital for training in simple hygiene, physiology and maternity work.

The Health Visitors, as well as doing general visiting, have supervised the puerperal periods of 114 women in their own homes.

Quarterly demonstrations and talks have also been held for the untrained African midwives—but it is evident that it is more important that every effort should be put into the thorough training of educated girls and women of a high standard to take their place in the near future.

G. M. L. SUMMERHAYES,
Woman Medical Officer.

31*st March,* 1929.

APPENDIX I.

MISCELLANEOUS. CASE REPORTS OF INTEREST AND EXTRACTS FROM ANNUAL REPORTS BY MEDICAL OFFICERS.

A case of Arsenical Poisoning following N.A.B. injections, reported by Dr. E. M. Franklin, Medical Specialist.

Patient was admitted to Hospital on September 8th, with the history of having received 10 intravenous injections of N.A.B. and five intramuscular injections of either Mercury or Bismuth. The N.A.B. injections were given twice weekly and covered the period of 30th July, 1928 to 4th September, 1928. On the night before he received his last injection, he suffered from violent pains in the abdomen and slight diarrhœa ; he also stated that after his last injection he suffered from fever all night and noticed some red spots on his skin which he considered were boils.

I first saw him on the evening of September 8th. His condition then was :—The skin of his neck and face was much swollen, hard and board-like to the touch and bright red in colour. This condition was general all over the body but seemed more marked on the face, neck and upper arms than on the lower extremities.

He was given an intramuscular .45 gramme of Ametox on admission and it was then noticed that the veins were found with difficulty owing to the swelling and hardness of the skin ; in addition to the Ametox he was also given Glucose and Sodii Bicarb 30 grs. three hourly per os, and put on a light diet containing the minimum amount of fat, and barley water as drink.

The following morning September 9th, his condition was worse, the swelling, redness and hardness of the skin increasing ; he was given a second intravenous injection of Ametox .45 gramme. Half an hour after the injection he had a rigor, his temperature rising to 101.4°.

September 10th, skin very swollen ; September 11th, Pyrexia continuing. Albumen now appearing in the urine ; skin harder. On the 12th, he was given Ametox .75 gramme ; skin was now beginning to crack at the flexures with a serous oozing. Other parts being covered with a branny desquamation ; albumen in urine.

On September 13th he was given Ametox .9 gramme with increasing difficulty owing to the swelling and ulcerations of the skin.

On 14th Ametox .9 gramme. The red colour of the skin was now beginning to fade. Desquamation more marked. General condition not so good, heart showing signs of involvement.

On September 15th the skin was generally less inflamed. Except on face and neck and ears which was fissured and oozing to a great extent with severe irritation.

On 16th his general condition was a good deal worse. Heart showed signs of failure, legs and feet much swollen. Albumen in urine. There was a loud systolic murmur in the aortic area with a reduplicated second sound.

Skin was generally bright red colour with large branny desquamating scales. Face and hands much swollen with cracks at corners of the mouth, ears and folds of the neck. His skin condition remained stationary ; his general condition was worse with marked wasting. Sleeplessness more marked.

On the 19th he was given 3 c.c. intramine intramuscularly which was followed next day by a rise in temperature to 103°. The skin was then desquamating all over in large flakes leaving a moist surface. There was then marked œdema of feet and legs and eyelids.

Intramine was given on the 20th in same dose, with a smaller reaction next day. His condition after the second injection of intramine began to improve.

Urine was quite free of albumen and heart sounds a little stronger. Bran baths were now started with good results. The pyrexia began to subside and the skin to clear.

The intramine was continued at weekly intervals up to November 22nd, from which period he became convalescent and was discharged on December 21st.

His treatment in addition to Ametox and Intramine was mainly symptomatic Dusting powders, Starch Boric acid and Calamine for the skin Digitalis for the heart condition and Opium and Medinal for the insomnia which was most persistent. He was given Marmite and Cod Liver Oil at an early stage in his illness and put on a carbohydrate diet.

His vision became weak at the 10th day of his disease but finally became normal His discs were normal at the time of his discharge and there was no evidence of any cardiac damage. His finger and toe nails which had been shed were beginning to repair and he was discharged cured on December 21st, 1928.

E. MORRIS FRANKLIN,
Medical Specialist.

31*st March*, 1929.

A CASE OF " GAS GANGRENE " REPORTED BY DR. MAGOWAN, MEDICAL OFFICER, TAMALE.

This patient named Aryee, a young man about 20 years of age was brought to the Hospital about 2.30 p.m. on the 19th February, 1929. He was engaged as a driver on a road roller. He was caught in the chain of the roller and his right leg from the middle of the calf downwards was squashed into pulp. He was left on the road for some little time and the whole leg was covered with dirt from the road. He had lost a considerable quantity of blood, but the bruising that the lad had undergone must have stopped the hæmorrhage to some extent.

When he was first seen he was suffering from shock but was quite conscious, and only asked to be put out of pain. Immediate amputation was necessary. Owing to the condition of the patient this had to be performed hurriedly and the degree of asepsis was necessarily less than one would have liked.

An amputation was done well below the knee joint but quite free from the damaged tissues. The condition of the patient remained wonderfully good during the operation, but two hours afterwards he almost died from shock. Intravenous Salines were given 200 cc. at a time every two hours. He was given Morphia $\frac{1}{4}$ grain and the condition was good at 6 p.m. on the morning of the 20th. He was then given 3,000 units Anti-Tetanic Serum. About noon on the 20th, he had a rigor and the temperature rose to 104° F. He remained restless and complained of pain in the stump. The stump was examined. It appeared rather puffy but was otherwise normal.

During the night of the 20th, he was restless and delirious. Next morning he vomited almost continuously and could not drink water. It was vomited immediately. The condition of the heart was distressed and the pulse was 130. The temperature was 103°F. The stump was again examined. It was very much swollen and covered with bullae. There was a thin slimy foul-smelling discharge coming from the wound. On palpation, emphysematous crackling could be detected as far as the condyles of the femur on the under surface of the stump. The clinical condition of " gas gangrene " was diagnosed. The stitches holding up the flaps together were removed and the whole allowed to lie open. Free incisions were made all over the stump wherever gas could be detected. There appeared to be little or no sensation in the stump and there was no bleeding from the incision. The muscular tissue was very pale in colour and where it was exposed to air it developed a green colour. The whole stump was put in a Eusol bath and kept there all day.

This mode of treatment was continued for four days, except that he had Boric fomentation at night instead of the bath and that the Eusol was changed to Hydrogen Peroxide on the third day.

On the night of the 21st, his condition appeared to be hopeless, but next morning there was a decided improvement. The gas gradually disappeared from the stump and the whole thing developed into a foul sloughing mass. The general condition of the patient improved and he began to take light diet.

About 10 days after the accident he was put on simple Eusol dressings. This mode of treatment was adopted in preference to high amputation, as the condition of the patient was too precarious to submit him to a further operation.

His temperature continued to run about 100° F. and he gathered strength slowly and on account of this and notwithstanding the risk of further infection the leg was again amputated on the 14th of March. The leg was amputated half way up the thigh with a long anterior flap. This time the stump healed by first intention, the temperature came down, and to-day, six weeks after the accident he is able to walk on crutches.

WILLIAM MAGOWAN,
Medical Officer.

3rd April, 1929.

SOME INTERESTING EYE CONDITIONS.

EXTRACTS FROM THE ANNUAL REPORT OF THE FIRST TRAVELLING DISPENSARY BY DR. G. F. T. SAUNDERS, MEDICAL OFFICER IN CHARGE.

* * *

At Lawra. A curious form of iritis was seen in seven patients. In each case the same history was given of a sudden attack of iritic pain lasting from three to ten days with photophobia and discharge of tears only, and followed by almost complete blindness. On examination each case presented posterior synechiae, sometimes total, and a very small quantity of lymph at the margins of the iris. The media were quite clear, except one case with slight cloudness of the cornea.

* * *

A stay of nineteen days was made at Tumu. Here the number of eye cases seen was very large.

The eye cases seen were quite different from those seen at Lawra. No cases were seen of the peculiar iritis described above. Conjunctivitis, trachoma, and ulcers of the cornea were common ; but in addition there were certain groups of cases which recurred with such frequency as to suggest special etiology.

(i) A chronic inflammation of the sclera, frequently associated with iritis, and gradually infiltrating the cornea with dense white opaque tissue. In some cases only a small window of transparent tissue is left ; and the final stage of the condition seems to be shrinking of the entire globe.

(ii) A condition similar to pterygium in which a more or less triangular patch of dull material extends on one or both sides of the cornea. The conjunctiva seems to be covered with a rather coarse pellicle, and vessels running in the pterygium can be moved freely over the sclera. Sometimes there are opacities or ulcers where the condition encroaches on the cornea. It frequently extends far enough to obscure vision.

(iii) The third condition is a diffuse form of the second. The entire bulbar conjunctiva is covered with a somewhat finer pellicle, with blood vessels as above. The cornea may be free, or may be slightly opaque with the sort of film. The reflex of light from the conjunctiva is dull and broken, suggesting some dryness and roughening ; but tears and other discharges are present.

Of these condition (i) is some form of scleritis, but no suggestion can be made as to etiology. In attempting to diagnose and treat the other two conditions, it has been found rather difficult to follow and to reconcile various authorities. One naturally thinks of Xerophthalmia ; but one finds that Stitt (1927) and MacCallum (1929) describe the dryness as being due to atrophy of lachrymal glands and lack of tears, while Swanzy (1925) describes the tears as unaltered, but changes in the conjunctiva prevent the tears wetting it, and Castellani (1919, p. 2002) speaks of the conjunctiva being moist. Intensive treatment of a few cases for some weeks in hospital should settle the diagnosis. One point in favour of Xerophthalmia is that a few cases of night-blindness have been seen in every village where this condition occurs. If it should prove to be Xerophthalmia, the addition of spinach to the diet could be used as a prohylactic ; it grows very easily here. Sweet potato tops could possibly be used. (Dalrymple, 1928).

Both in Lawra and Tumu it is believed that the nodules of *Onchocerca volvulus* cause eye disease when situated on the scalp. For this reason a considerable number of people come to have them removed. The tumours are freely movable, but are situated, not in loose areolar layer of the scalp, but in the epicranium, and often attached to bone by a definite pedicle. Native surgeons remove them by burning the skin and then extracting the tumours with a knife. This is often neatly done ; occasionally they fail, and, indeed, the removal of a small, highly mobile, deep specimen is often more difficult than it looks. Two soft small specimens were burst during removal ; white material oozed from the wound some days after.

The species was identified by the Medical Research Institute. No co-relation was found between eye-disease and the nodules though both are common and a few cases had both conditions. On the other hand two sisters were treated of whom one had a nodule and the other conjunctivitis. Apart from the extraordinary fact of finding the same belief in Guatemala and in Lawra-Tumu, the situation of the tumours calls for some remarks. Brumpt (1927) states that *O. volvulus* occurs on the head in only 1% of cases. Fulleborn (1924) refers to an *Onchocerca* node on the occiput as " a very rare exception in Africa." Dyce Sharp (1926) at Kaduna, where the tumours are frequently met with, has never seen a tumour on the head. On the other hand *O. caecutiens* occurs in 97% of the inhabitants of the infected zone, and in 99% of those is on the head. This does not occur here. Again the removal of *O. caecutiens* tumours cures the eye conditions in a few days or a few hours (Robles, quoted by Brumpt, 1927, p. 757). No improvement in eye conditions has been seen for a week after removal, nor did any bad result follow the bursting of the two nodules.

* * *

G. F. T. SAUNDERS, *Medical Officer,*
No. 1 Travelling Dispensary, Lawra,
31*st March,* 1929.

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REPORT ON A CASE OF IMPERFORATE ANUS.

BY DR. A. C. PATERSON, ACTING SENIOR MEDICAL OFFICER, KUMASI.

On the 12/3/29 a small male child said to be three days old was brought to the Hospital by his mother and relatives who stated that the child had no anus.

On examination the baby appeared to be about a week old. It had no anus and there was no dimple or indication as to where the anus should have been. There was no bulging to be noted when the child cried.

After a great deal of persuasion the relatives gave their consent to operation.

Operation : The baby was given a small quantity of Ether for the skin incision and the operation was completed without any further anaesthesia.

An incision was made from behind the Scrotum to just beyond the tip of the Coccyx and careful dissection carried out through the subcutaneous tissues. No sign of bowel was noticed until a depth of about 1½ inches was reached when a soft ballooning swelling was encountered. This was carefully dissected out and freed sufficiently to be pulled down to the skin edges to which it was sutured. The bowel was then opened and a vast quantity of very dark green material of the consistency of treacle oozed out.

The cut edges were then carefully sutured to the skin edge all round.

Two days after the operation the mother became insane.

The baby was fed on Glaxo.

The patient, contrary to expectation did extremely well and healed up beautifully in a very short time.

Unfortunately the baby was only in hospital three weeks because the relatives insisted on taking it away.

There are two main points of interest in this case :—

(*a*) The fact of recovery because the operative mortality in such cases is always very heavy.

(*b*) The fact that such cases are very rarely seen in this country on account of the native attitude towards such. A baby born with such a deformity disappears as a general rule on account of the belief that a pregnant woman who has once gazed on such a child will give birth to a baby suffering similarly.

A. C. PATERSON,
Acting Senior Medical Officer.

KUMASI,
31*st March,* 1929.

CASE OF TUMOUR OF SPLEEN WITH TWISTED PEDICLE SIMULATING APPENDIX ABSCESS.

REPORTED BY DR. L. D'A QUIGLEY, MEDICAL OFFICER, KUMASI.

A man of about 40 years was admitted to the African Hospital at Kumasi complaining of abdominal pain. The history was vague and not very helpful. A week previously he was seized with general abdominal pain. He was able to move about for two or three days, and then has to lie down. He was constipated and had nausea, and having tried native treatment with no good result he came to hospital on the 6th day of his illness. There was no history of injury or any sudden seizure with pain.

On admission his condition was as follows. The pulse was rapid and weak, respiration shallow, and temperature 100.4° F.

The tongue was thickly furred. There was thirst but no inclination for food. There had not been a bowel motion for two days. The right leg was flexed upon the abdomen. There was a visible bulging of the abdominal wall in the right iliac fossa, tender on palpation. The muscles over the right half of the abdomen were rigid. On palpation a tumour could be felt occupying the whole of the right iliac fossa, and extending to the middle line and to the level of the umbilicus above. The tumour was rounded and resilient. The general condition was fairly good. Appendix abscess was diagnosed, and it was decided to operate immediately.

Operation. An incision was made over the swelling. On opening the peritoneum there was a rush of dark red blood, and about a pint and a half of blood was evacuated. The incision was enlarged, and dark bluish solid body presented in the wound. On investigation this was seen to be an enlarged spleen which was twisted three or four times on its pedicle. There was a rupture about an inch and a half in extent in the body of the spleen. The pedicle was ligated and the spleen removed.

The abdominal cavity was swabbed out, and the wound closed with drainage. The patient died the following day. The spleen was about the size of a large ostrich egg. The greater portion of it was spongy and resilient. At its lower pole was a solid pale portion the size of a tangerine orange. A section gave two similar halves, one of which was sent to Dr. Butler, D.M.R.I. at Accra.

The following is an extract of the pathological report :—

> " It consisted of a yellowish grey solid portion which faded rather sharply at its periphery into the spleen tissue which consisted very largely of hæmorrhagic tissue with patches of necrosis appearing as yellow greyish irregular areas surrounded by deeply hæmorrhagic edges. A section made through the tumour-like material consisted wholly of whorls of very cellular spindle-celled tissue, in appearance like a spindle celled Sarcoma. No mitotic figures were noticed . . . In view of the absence of any other evidence of malignant disease, I am inclined to regard the tumour as a very cellular fibroma."

The interest of this case lies in the close simulation of an appendix abscess and in the absence of a picture of internal hæmorrhage.

L. D'A. QUIGLEY,
Medical Officer.

KUMASI,
31*st March,* 1929.

REPORT ON TWO CASES OF CHRONIC ENCEPHALITIS LETHARGICA SEEN AT THE GOLD COAST HOSPITAL, IN 1928.

BY DR. A. J. HAWE, MEDICAL OFFICER, GOLD COAST HOSPITAL.

These two cases reported present a syndrome which clinically demands a diagnosis of chronic encephalitis lethargica. Unfortunately there is no specific laboratory test yet available to confirm such a diagnosis, but the absence of changes in the spinal fluid such as would be met in the other conditions which produce a clinical condition resembling the above, is very suggestive, and of great value in the differential diagnosis. Both the cases reported have been investigated as far as laboratory examination permit. A brief resume of the salient features of these cases may be of interest.

Case No. 1. Female, aged about 30 years, from the Krobo country. Admitted on 3rd April, 1928, complaining of waist pains and difficulty in walking with general tremors of one year's duration. The appearance of the tremor was followed by a generalised bodily weakness. There was no history to suggest any previous syphilitic infection.

The patient presented the picture of an advanced degree of Parkinsonism. There were also mental changes which showed themselves by an excessive degree of emotionalism with intervals of mental dullness.

The deep and superficial reflexes showed no evidence of implication of the pyramidal system. Both pupils reacted rather sluggishly to light, but it was impossible to determine the reaction to accommodation. There was no strabismus, and the patient did not give any history of previous diplopia. The tremor was very marked and the presence of muscular weakness was easily confirmed.

Lumbar Puncture. The fluid was not under pressure and showed abnormalities.

Cells. 3 per cu.m.m.
Pandy and Nonne Apelt tests were negative.
No excess of protein.
Wassermann reaction was negative.

The glucose was not quantitatively determined.

The patient was discharged on 25th August, 1928, without any improvement.

Case No. 2. Male Krooboy, aged about 20 years, admitted into the Gold Coast Hospital, 12th April, 1928. Complained of a generalised tremor which commenced three years previously, and which the patient stated disappeared and re-appeared periodically.

On examination. There was a generalised tremor which was fairly rapid and disappeared during sleep. The facial expression was one of a mild degree of Parkinsonism, but there were no mental symptoms observed. From an examination of the deep and superficial reflexes it was obvious that the pyramidal tract had been involved, but this was thought to be a " neighbourhood symptom " due to interference with these tracts in the region of the mid-brain. The pupils were sluggish in their reaction to light stimulus.

Cerebro-spinal fluid :

Cells 5 per cu.m.m.
Pandy and Nonne Apelt tests were negative.
No excess of protein.
W.R. Negative.

BLOOD WASSERMANN-DOUBLE POSITIVE.

As there was evidence of previous Yaws, this was held to be sufficient to explain the blood Wassermann. There was no noticeable improvement with a course of anti-syphilitic treatment.

Comment. This patient was discharged 28th April, 1928, without any improvement. The occurrence of encephalitis after 1918, has been almost universal in its distribution, and there is no reason to suppose that West Africa had been spared completely. In outstations, the difficulty of diagnosis in the majority of nervous conditions is due to lack of facilities for examination and to the occurrence of such conditions as cerebral and nervous syphilis and trypanosomiasis which cannot be excluded without an examination of the spinal fluids in a fair proportion of cases.

A. J. HAWE,
Medical Officer.

GOLD COAST HOSPITAL,
31ST MARCH, 1929.

A CASE OF SUSPECTED PELLAGRA, REPORTED BY DR. W. MAGOWAN, MEDICAL OFFICER, TAMALE.

The patient, named Ali Wangara, was admitted to hospital on the 22nd December, 1928. He came from Yapei, a distance of thirty miles from Tamale.

He was a boy aged about eight years. On admission he was quite unable to walk and could not give a history of the case, but they stated that his mother told them that the boy had been getting very weak for the past two months and that for the past month he had begun to " swell up. "

Examination of the Case :—The boy was extremely weak and could not walk, talk, or see. He was oedematous all over the body, but more especially under the eyes, which were quite closed, and over the abdomen. His hair was very scanty and dry. The skin was tense and shiny. There were well marked areas of hyperpigmentation on the forehead, the neck and down the sterum, on the backs of the hands and wrists, and on the dorsum of the feet.

There were no marks of yaws lesions on the skin.

The heart sounds were feeble, but regular, and no valvular lesion was detected. There was a considerable degree of tachycardia. The pulse rate was about 110.

The lungs were perfectly sound. Beyond the degree of distension and oedema of the abdominal wall there was nothing abnormal to be made out in the abdomen.

The tongue was coated and very white. There was a considerable degree of anaemia. The knee jerks were absent and there were no other abnormal reflexes.

A blood smear was taken. There were no parasites present. There seemed to be a relative increase of oesinophilis, but no differential count was taken. Examination of the stools revealed the presence of the ova of *Ascaris lumbricoides*. There was no albumen in the urine nor any sugar. Microscopic examination of the urine did not reveal anything abnormal.

Progress of the case. From the appearance of the patient the condition was thought to be due to a deficiency in the diet. He was given carbon tetrachloride and oil of chenopodium as a vermifuge. About five Ascaris worms were voided. He was then put on a diet of native rice, green food (i.e., tops of sweet-potatoes), eggs, tomatoes, and milk. He had a teaspoonful of cod liver oil and malt three times daily. Little change was noticed in the first few days. He complained of abdominal pain. The case was then taken over by the A.D.M.S., Tamale. He was of opinion that the boy had nephritis and put him on saline treatment, but continued the above diet. The boy did not make any progress and the oedema and weakness continued.

Dr. McGregor took over the case about the 7th or 8th of January. He held the opinion that the case was one of avitaminosis, but thought he had an infection with *Entamoeba histolytica*. He gave him Emetine hydrochloride subcutaneously but the heart condition was so bad that this was discontinued.

The patient began to make some progress about the middle of January. The oedema lessened, and it was possible to realise the terrible degree of emaciation. He became much brighter mentally and was able to talk. From time to time he had relapses. The oedema returned. He would complain of abdominal pain, and this was accompanied by a corresponding dulness in the mental condition. From the 1st of February, good progress was maintained. The boy commenced to eat voraciously and though still a mere skeleton he became able to get up and walk around the hospital. The skin over the areas of hyperpigmentation peeled off leaving a normal skin. Unfortunately there was no means of weighing him but it was obvious that he was putting on weight rapidly.

Good progress was maintained and the boy was discharged from the hospital on the 8th of March, 1929.

He has reported at the hospital several times since then, and one could say that he is a normal boy of eight years of age.

The diagnosis of the case is open to discussion. It was given as pellagra and the reasons for doing this are as follows :—

No albumen was detected in his urine and that ruled out nephritis.

No amoebae were detected in the stools. The assumption that he had an infection was built on the symptom of pain in the lower abdomen. The Ascaris infection would not in itself account for the grave condition. From the dryness of the skin oedema, anaemia and emaciation one could not help but think that it was a condition of avitaminosis due to a deficient diet. The response to his altered diet bears out this point of view.

The hyperpigmentation on the forehead, hands, feet, neck and chest, combined with a condition of avitaminosis made one think of pellagra. Against this diagnosis there is the fact that he had loss of the deep reflexes which is the opposite of the text-book account of pellagra. The fact that this condition is rarely, if even diagnosed in this country is also a strong argument against the diagnosis. The age of the patient is probably another argument against the diagnosis, but the fact that this was a deficiency disease, combined with the distribution of the hyperpigmentation as in pellagra tempts one to venture the diagnosis as pellagra.

WILLIAM MAGOWAN,
Medical Officer.

TAMALE,
31*st* *March*, 1929.

APPENDIX J. (SANITATION BRANCH.)

ANALYSIS OF WATER SAMPLES, ACCRA.

	Total Number of Samples.	Number without B. coli in 100 cc.	Number having B. coli in 100 cc.	Number having B. coli in 10 cc or less.	Percentage of Samples giving no B. coli in 100 cc.
Storage Reservoir No. 1	9	7	1	1	77·7
Storage Reservoir No. 2	13	8	5	—	61.5
Final Filter No. 1	10	9	1	—	90.0
Final Filter No. 2	7	7	—	—	100.0
Final Filter No. 3	8	8	—	—	100.0
Final Filter No. 4	11	10	1	—	99·9
Final Filter No. 1	9	9	—	—	100.0
Final Filter No. 6	8	8	—	—	100.0
Laboratory Tap.	49	47	2	—	95·5

The following table summarises the results over a period of eight years as regards the percentage of samples of water of 100 cc capacity in which the presence of B. coli could not be demonstrated.

	1921.	1922.	1923.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.
Storage Reservoir	72.0	57·7	33·3	25.0	62.5	40.0	37·0	68.1
Filter Beds ..	73·1	79.6	71.1	82.7	78.0	81.1	54·9	96.2
Taps in Accra ..	77·1	38.5	38.4	50.0	63.5	62.3	43·1	95·5

It will be noted that the standard of purity of the water supply attained in 1928–29 was higher than ever before. This reflects much credit on the responsible officers.

The following extract from notes kindly supplied by the Maintenance Engineer, Water Works, Accra, are of interest in connexion with the treatment of Accra water. It will be noted that chlorination takes place between the final filters and the service reservoir :—

" There have been no changes of method of purification during the year under review.

" The new plant for treatment of the raw river water with Aluminium Sulphate was put into operation early in 1927, and the two processes (Aluminium Sulphate and Excess Lime) are now worked together in equal quantities as nearly as is convenient.

" The 'Excess Lime' treated water is that from the storage Reservoirs Nos. 1 and 2 which are filled and drawn from alternately.

" The 'Aluminium Sulphate' water is taken direct from the river to the treatment plant and subsequently filtered.

" The waters are partially mixed on entering the Pre-filter and still more mixed on entering the Final Filters.

" Final Filter No. 1 gets mostly sulphated water and the proportions vary up to No. 6 which gets most of the limed water.

" Chlorine is added at the common collecting channel leading to the clear water (or service) reservoir.

" The accompanying statement shews the daily averages proportions of the different waters used during each month together with the range of doses of Aluminium Sulphate and Chlorine.

" The amount of 'Excess Lime' after filling a storage reservoir ranges from three to four parts per 100,000."

ACCRA WATER WORKS, 1928–29.

Month.	River Water Quantity gallons per day.	Aluminium Sulphate dose parts per 100,000.	" Excess Lime " Water Quantity gallons per day.	Chlorine parts per 1,000,000.
April	200,000	6½ to 16	450,000	0.25
May	250,000	10 to 14	350,000	0.25
June	250,000	11 to 13	350,000	0.25 to 0.5*
July	250,000	13 to 15	300,000	0.5 to 0.7
August	250,000	15 to 18	350,000	0.7
September	250,000	8 to 9⅓	350,000	0.7
October	300,000	8	350,000	0.7
November	300,000	8	350,000	0.5 to 0.7
December	300,000	8	350,000	0.5
1929.				
January	300,000	7½ to 8½	350,000	0.5 to 0.7
February	350,000	7 to 8	300,000	0.5
March	300,000	7 to 12	400,000	0.5 to 1.0†

*=Increased on 10th June. †=Increased on 28th March.

APPENDIX K.

SANITATION BRANCH.

ACCRA WATER SUPPLY.

Bacteriological Examination of Samples from Reservoirs, Final Filters and Laboratory Taps, April, 1928 to March, 1929.

+ = Smallest volume of water yielding B. coli.

— = Absence of B. coli in the respective volumes stated at head of columns.

Adopted test of typical B. coli :—

Lactose + positive.
Indol + positive.

Date.	Source of Sample.	100 cc.	10 cc.	1 cc.	0.1 cc.
April 5th	Laboratory Tap	—			
April 5th	Final Filter No. 4	+	—		
April 5th	Storage Reservoir No. 2	+	—		
April 12th	Laboratory Tap	+	—		
April 12th	Final Filter No. 5	—			
April 19th	Laboratory Tap	—			
April 19th	Storage Reservoir No. 2	+	—		
April 19th	Final Filter No. 6	—			
April 26th	Laboratory Tap	—			
April 26th	Final Filter No. 4	—			
May 3rd	Laboratory Tap	—			
May 3rd	Storage Reservoir No. 2	—			
May 3rd	Final Filter No. 4	—			
May 10th	Laboratory Tap	—			
May 10th	Final Filter No. 4	—			
May 17th	Laboratory Tap	—			
May 17th	Storage Reservoir No. 2	—			
May 17th	Final Filter No. 5	—			
June 7th	Laboratory Tap	—			
June 7th	Final Filter No. 1	—			
June 14th	Laboratory Tap	—			
June 14th	Final Filter No. 3	—			
June 14th	Storage Reservoir No. 1		+	—	
June 21st	Laboratory Tap	—			
June 21st	Final Filter No. 4	—			
June 28th	Laboratory Tap	—			
June 28th	Final Filter No. 5	—			
June 28th	Storage Reservoir No. 1	—			
July 5th	Laboratory Tap	—			
July 5th	Final Filter No. 6	—			
July 12th	Laboratory Tap	—			
July 12th	Storage Reservoir No. 1	—			
July 12th	Final Filter No. 1	—			
July 19th	Laboratory Tap	—			
July 19th	Final Filter No. 2	—			
July 26th	Laboratory Tap	—			
July 26th	Storage Reservoir No. 1	—			
July 26th	Final Filter No. 3	—			
August 2nd	Laboratory Tap	—			
August 2nd	Final Filter No. 4	—			
August 9th	Laboratory Tap	—			
August 9th	Final Filter No. 5	—			
August 9th	Storage Reservoir No. 1	—			
August 16th	Laboratory Tap	—			
August 16th	Final Filter No. 6				
August 23rd	Laboratory Tap	—			
August 23rd	Low Level Tank No. 1	—			
August 23rd	Final Filter No. 1	—			
August 30th	Laboratory Tap	—			
August 30th	Final Filter No. 2	—			
September 6th	Final Filter No. 3	—			
September 6th	Storage Reservoir No. 2	—			
September 13th	Laboratory Tap	—			
September 13th	Final Filter No. 4	—			
September 20th	Laboratory Tap	—			
September 20th	Final Filter No. 5	—			
September 27th	Final Filter No. 6	—			
September 27th	Laboratory Tap	—			

APPENDIX K.—*continued.*

Date.	Source of Sample.	100 cc.	10 cc.	1 cc.	0.1 cc.
October 4th	Final Filter No. 1	—			
October 4th	Storage Reservoir No. 2	—			
October 4th	Laboratory Tap	—			
October 11th	Final Filter No. 2	—			
October 11th	Laboratory Tap	—			
October 18th	Storage Reservoir No. 2	—			
October 18th	Final Filter No. 3	—			
October 18th	Laboratory Tap	—			
October 25th	Final Filter No. 4	—			
October 25th	Laboratory Tap	—			
November 1st	Final Filter No. 5				
November 1st	Storage Reservior No. 2	—			
November 1st	Laboratory Tap	—			
November 8th	Final Filter No. 6	—			
November 8th	Laboratory Tap	—			
November 15th	Final Filter No. 1	—			
November 15th	Storage Reservoir No. 1	—			
November 15th	Laboratory Tap	—			
November 22nd	Final Filter No. 2	—			
November 22nd	Laboratory Tap	—			
November 29th	Final Filter No. 3	—			
November 29th	Storage Reservoir No. 1	—			
November 29th	Laboratory Tap	—			
December 6th	Final Filter No. 4	—			
December 6th	Laboratory Tap	—			
December 13th	Storage Reservoir No. 1	—			
December 13th	Final Filter No. 5	—			
December 13th	Laboratory Tap	—			
December 20th	Final Filter No. 6	—			
December 20th	Laboratory Tap	—			
December 27th	Final Filter No. 1	—			
December 27th	Storage Reservoir No. 1	+	—		
December 27th	Laboratory Tap	—			
January 3rd	Final Filter No. 2	—			
January 3rd	Laboratory Tap	—			
January 10th	Low Level Reservoir No. 1		+	—	
January 10th	Final Filter No. 3	—			
January 10th	Laboratory Tap	—			
January 17th	Final Filter No. 4	—			
January 17th	Laboratory Tap	—			
January 24th	Final Filter No. 5	—			
January 24th	Storage Reservoir No. 2	—			
January 24th	Laboratory Tap	—			
January 31st	Final Filter No. 6	—			
January 31st	Laboratory Tap	—			
February 7th	Final Filter No. 1	+	—		
February 7th	Storage Reservoir No. 2	+	—		
February 7th	Laboratory Tap	—			
February 14th	Final Filter No. 2	—			
February 14th	Laboratory Tap	—			
February 21st	Storage Reservoir No. 2	+	—		
February 21st	Final Filter No. 3	—			
February 21st	Laboratory Tap	—			
February 28th	Storage Reservoir No. 2	—			
February 28th	Final Filter No. 4	—			
February 28th	Laboratory Tap	—			
March 7th	Final Filter No. 5	—			
March 7th	Final Filter No. 6	—			
March 7th	Laboratory Tap	—			
March 14th	Final Filter No. 1	—			
March 14th	Storage Reservoir No. 2	+	—		
March 14th	Laboratory Tap	—			
March 21st	Final Filter No. 2	—			
March 21st	Alumina Outfall	+	—		
March 21st	Laboratory Tap	+	—		
March 28th	Final Filter No. 1	—			
March 28th	Final Filter No. 3	—			
March 28th	Laboratory Tap	—			

APPENDIX L.

SANITATION BRANCH.

ANALYSIS OF WATER SAMPLES, SEKONDI AND TAKORADI.

Origin of Sample.	Total Number of Samples.	Number without B. coli.	Number having B. coli in 100 cc. but not in a lesser quantity.	Number having B. coli in 10 cc. or less.	Percentage of Samples having no B. coli in 100 cc.
Takoradi Tap ..	13	4	6	3	30.7
Takoradi Residential Area	32	6	8	18	18.7
Takoradi Harbour	32	4	5	23	12.5
Final Filter No. 1	1	1	—	—	100.0
Final Filter No. 1	1	—	—	1	100.0

The percentage of samples of water from the laboratory and standpipes connected with the distribution system of the Sekondi and Takoradi water supply, in 100 cc. of which the presence of B. coli has not been detected, varies from 93.7 in the first four months of 1922, to 64.6 in the year 1927–28, and to 18.1 in 1928–29. The steady decline in the standard of purity is very disturbing particularly as water supplied to ships at Takoradi is obtained from this source.

Two possibilities exist to account for this unsatisfactory state of affairs namely, the failure of the filtration plant—it has been found necessary to provide additional filtration plant estimated to cost £20,000—and the faulty laying of the main to Takoradi. The main was laid by the first contractors employed in connection with the Takoradi Harbour Works and not under the supervision of the Maintenance Engineers of the Public Works Department.

APPENDIX M.

SANITATION BRANCH.

TAKORADI WATER SUPPLY.

Bacteriological Examination of Samples from Reservoirs, Final Filters and Laboratory Taps, April, 1928 to March, 1929.

+ = Smallest volume of water yielding B. coli.

— = Absence of B. coli in the respective volumes stated at head of columns.

Adopted test of typical B. coli :—

Lactose + positive.
Indol + positive.

Date.	Source of Sample.	100 cc.	10 cc.	1 cc.	0.1 cc.
1928.					
April 10th	Sekondi Laboratory Tap			+	—
September 27th	Takoradi Residential Area	+	—		
September 27th	Takoradi Harbour	+	—		
October 1st	Takoradi Residential Area	+	—		
October 1st	Takoradi Harbour	+	—		
October 4th	Takoradi Residential Area	+	—		
October 4th	Takoradi Harbour		+	—	
October 8th	Takoradi Residential Area	+	—		
October 8th	Takoradi Harbour	+	—		
October 13th	Takoradi Residential Area		+	—	
October 13th	Takoradi Harbour	+	—		
October 16th	Takoradi Residential Area	+	—		
October 16th	Takoradi Harbour		+	—	
October 20th	Takoradi Residential Area	—			
October 20th	Takoradi Harbour		+	—	
October 23rd	Takoradi Residential Area	—			
October 23rd	Takoradi Harbour		+	—	
October 27th	Takoradi Residential Area	+	—		
October 27th	Takoradi Harbour	+	—		
October 30th	Takoradi Harbour			+	—
October 30th	Takoradi Residential Area		+	—	
November 3rd	Takoradi Residential Area				+
November 3rd	Takoradi Harbour			+	—
November 6th	Takoradi Harbour			+	—
November 6th	Takoradi Residential Area			+	—
November 6th	Sekondi Final Filter No. 1	—			
November 10th	Takoradi Residential Area		+	—	
November 10th	Takoradi Harbour		+	—	
November 13th	Sekondi Raw (Inchaban)			+	—
November 13th	Sekondi Final Filter No. 2		+	—	
November 13th	Sekondi Laboratory Tap	+	—		
November 13th	Takoradi Residential Area		+	—	
November 13th	Takoradi Harbour			+	—
November 17th	Takoradi Residential Area		+	—	
November 17th	Takoradi Harbour		+	—	
November 20th	Takoradi Residential Area		+	—	
November 20th	Takoradi Harbour		+	—	
November 20th	Sekondi Laboratory Tap	+	—		
November 27th	Takoradi Harbour		+	—	
November 27th	Takoradi Residential Area		+	—	
November 27th	Sekondi Laboratory Tap		+	—	
December 4th	Takoradi Residential Area	+	—		
December 4th	Takoradi Harbour		+	—	
December 4th	Sekondi Laboratory Tap		+	—	
December 8th	Takoradi Harbour			+	—
December 8th	Takoradi Residential Area			+	—
December 11th	Takoradi Residential Area			+	—
December 11th	Takoradi Harbour		+	—	
December 11th	Sekondi Laboratory Tap	+	—		
December 15th	Takoradi Residential Area		+	—	
December 15th	Takoradi Harbour		+	—	
December 18th	Takoradi Residential Area		+	—	
December 18th	Takoradi Residential Area		+	—	
December 18th	Takoradi Harbour		+	—	
December 18th	Sekondi Laboratory Tap	—			
1929.					
January 5th	Takoradi Residential Area		+	—	
January 5th	Takoradi Harbour		+	—	
January 8th	Sekondi Laboratory Tap		+	—	
January 8th	Takoradi Residential Area		+	—	

APPENDIX M.—*continued.*

Date.	Source of Sample.	100 cc.	10 cc.	1 cc.	0.1 cc.
January 8th	Takoradi Harbour		+	—	
January 12th	Takoradi Residential Area		+	—	
January 12th	Takoradi Harbour				+
January 15th	Takoradi Residential Area		+	—	
January 15th	Takoradi Harbour		+	—	
January 15th	Sekondi Laboratory Tap	+	—		
February 5th	Sekondi Laboratory Tap	(No test)	—		
February 5th	Takoradi Residential Area		+	—	
February 5th	Takoradi Harbour		+	—	
February 12th	Sekondi Laboratory Tap	+	—		
February 12th	Takoradi Residential Area			*—	—
February 12th	Takoradi Harbour			*—	
February 19th	Sekondi Laboratory Tap		*—	—	
February 19th	Takoradi Residential Area			*—	
February 19th	Takoradi Harbour			*—	
February 26th	Sekondi Laboratory Tap	†—		—	
February 26th	Takoradi Residential Area			*—	
February 26th	Takoradi Harbour		*—	—	
March 12th	Takoradi Residential Area		†+	—	
March 12th	Takoradi Harbour		†+	—	
March 19th	Sekondi Laboratory Tap		†*—	—	
March 19th	Takoradi Residential Area		†*—	—	
March 19th	Takoradi Harbour		†*—	—	

† = B. pyocyaneus present.
* = Atypical non-indole producing b. coli present.

APPENDIX N.

SANITATION BRANCH.

ANALYSIS OF MORE IMPORTANT CONDITIONS TREATED IN OUT-PATIENT DEPARTMENT OF CHILD WELFARE CLINICS, 1928-29.

Disease.	Male.	Female.	Total.	Ratio to Diseases due to all causes.
Yaws	5,562	5,060	10,622	28.3
Malaria	2,986	3,040	6,026	16.1
Diseases of Digestive System	3,054	2,872	5,926	15.8
Diseases of Respiratory System	2,618	3,210	5,828	15.6
Affections of Skin and Cellular Tissues	1,108	1,177	2,285	6.1
Affections of Nervous System and Organs of Special Sense	881	820	1,701	4.5
Diseases of Infancy	401	375	776	2.0
Whooping Cough	374	357	731	1.9
Dysentery	309	167	476	1.2
Affections produced by External Causes	167	135	302	0.8
Affections of Circulatory System	86	72	158	0.4
Diseases of Bones and Orphans of Locomotion	39	82	121	0.3
Diseases of Genito-Urinary System	54	62	116	0.3
Other conditions not enumerated above	897	1,370	2,267	6.0
Total	18,536	18,799	37,355	—

APPENDIX O.

SANITATION BRANCH.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1928–29 IN CONTAGIOUS DISEASES HOSPITALS AT ACCRA, WINNEBA, CAPE COAST, SEKONDI, KOFORIDUA AND KUMASI.

Disease.	Remaining in Hospital at 31st March, 1928.	Yearly. Admissions.	Total Deaths.	Total cases. Treated.	Remaining in Hospital at 31st March, 1929.
I. EPIDEMIC, ENDEMIC AND INFECTIOUS DISEASES.					
Varicella	50	368	—	418	46
Leprosy	53	25	1	78	53
Tuberculosis, Pulmonary, Laryngeal	—	26	16	26	3
Tuberculosis of the Vertebral Column	—	1	1	1	—
Yaws	4	9	—	13	—
Small-pox	—	3	—	3	—
Measles	—	2	—	2	—
Malaria	—	1	1	1	—
Dysentery	—	1	1	1	—
Trypanosomiasis	—	1	1	1	—
Syphilis	—	1	—	1	1
Gonorrhoea	—	1	—	1	—
II. GENERAL DISEASES.					
Beri-Beri	—	6	1	6	2
III. AFFECTIONS OF THE NERVOUS SYSTEM AND ORGANS OF THE SENSES.					
Meningitis (not including Tuberculous Meningitis or Cerebro-spinal Meningitis)	—	1	—	1	—
Other forms of Mental Alienation	—	1	—	1	—
IV. AFFECTIONS OF THE CIRCULATORY SYSTEM.					
Lymphangitis	—	1	1	1	—
V. AFFECTIONS OF THE RESPIRATORY SYSTEM.					
Bronchitis (Acute)	—	1	1	1	—
Pneumonia	—	3	1	3	—
Pleurisy	—	1	1	1	—
VI. DISEASES OF THE DIGESTIVE SYSTEM.					
Intestinal Parasites	—	1	—	1	—
Hernia	—	1	1	1	—
Abscess of Liver	—	1	—	1	—
IX. AFFECTIONS OF THE SKIN AND CELLULAR TISSUES.					
Scabies	—	1	—	1	—
Ulcers	—	9	4	9	—
XIV. AFFECTIONS PRODUCED BY EXTERNAL CASES.					
Hunger	—	11	2	11	1
Contacts	—	46	—	46	—
Total	107	523	33	630	106

APPENDIX P.

SANITATION BRANCH.

SIR,

I have the honour to submit to you the Return of Diseases (Out-patient) for the year 1928–29, for the Welfare Centre at Christiansborg, together with figures showing the number of cases having attended the centre during the year, of those having attended the ante-natal clinic, the school children's clinic, and details of the medical examinations of school children which have been made.

2. I submit, also, as requested, notes on the comparative conception rate.

3. As I have been so short a time at the centre, I feel that the figures attached will give a clearer idea of the work done there than any written comment of mine could do.

I have, etc.,

ISOBEL M. MALCOLM AITKEN,
Medical Officer,
Christiansborg Welfare Centre.

THE DEPUTY DIRECTOR OF SANITARY SERVICE,
VICTORIABORG, ACCRA.

CHILD WELFARE CLINIC.

The diseases from which the greater number of children suffered were :—

1. Yaws.
2. Malaria.
3. Intestinal and Gastric Affections.
4. Affections of the Respiratory Tract.
5. Eye diseases.

Yaws. Weekly injections of Sobita intramuscularly in doses varying from 1–3 grs. over a period of from 6–10 weeks proved satisfactory in the treatment of yaws.

Malaria. This disease was common at all ages, and in the majority of cases in which the blood was examined was of the subtertian type.

Intestinal and Gastric Affections. Diarrhœa and enteritis formed the bulk of these complaints, while " dyspepsia " due to the pernicious habit of " feeding at any time " was common ; many of the diarrhœa cases were due also to this custom.

Affections of the Chest. These took, for the most part, the form of " cough " of unknown origin frequently combined with symptoms of malaria and occasionally with those of helminthic affections.

Eye diseases. Conjunctivitis was the most common and might be attributed mainly to the wind driven sand and dust in the district.

Helminthic affections were comparatively rare ; otorrhœa was the most common ear affection ; while of the zymotic diseases measles and whooping cough were the only two which were diagnosed in any appreciable numbers.

COMPARATIVE FIGURES OF CONCEPTION RATE, ETC.

Dr. J. M. O'Brien's Figures. 1924.		Christiansborg Clinic. 1928–29.
Women questioned 1,000.		Women questioned 308.
Number of children born	3,666	670
Number which survived infancy	2,742	504
Number of miscarriages	422	83
Average number born per woman	3.6	2.76
Average number surviving infancy per woman	2.7	2.08
Average number of miscarriages per woman	0.4	0.27
Average conception rate	4.0	3.03
Infantile death rate=252 per 1,000		247 per 1,000.
Loss on conception rate=329 per 1,000		330 per 1,000.
Dr. O'Brien divided deaths of children into :— (*a*) Those who died before they could walk. =infantile mortality. (*b*) Those who died after they could walk.		It is regretted that owing to incompleteness of histories, these figures are not available.

The figures below give the actual numbers of pregnancies. The larger numbers of 1st, 2nd, and 3rd pregnancies may be attributed probably to the rather early marriage age from 16 to 18 and upwards.

Pregnancies.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.
Number out of 308 questioned	66	62	54	47	31	15	16	7	3	5	0	1	1

YEARLY REPORT ON CHILD WELFARE AND MATERNITY WORK CARRIED ON AT THE INFANT CLINIC AT CHRISTIANSBORG, DURING APRIL, 1928—MARCH, 1929.

Child Welfare Work.

I. Infant Clinic :—

New cases	4,630	Attendances	7,308
Old cases	4,299	Attendances	6,674
Total cases	8,929	Total attendances	13,982

II. School Children treated :—

New cases	307	Attendances	448
Old cases	993	Attendances	1,704
Total cases	1,300	Total attendances	2,152

Mother Welfare Work.

I. Number of expectant mothers examined at the Clinic :—

New cases	324	Attendances	472
Old cases	372	Attendances	568
Total cases	696	Total attendances	1,040

II. Number of Wassermann tests carried out 89 (November, 1928—March, 1929). Number found positive 32.

III. Number of domiciliary visits made by :—

Lady Medical Officers 834, Health Visitors 980, Government Midwife 4,462.

IV. Number of mothers delivered in their homes by :—

Lady Medical Officer 0, Government Midwife 9.

V. Number of packages of lint or dressings issued to private Midwives, 50.

VI. Number of lectures given to Midwives 19, Health Visitors, 0.

Name of School.	Number of Children.	Remarks.
1. Wesleyan Mission 2. Wesleyan Mixed 3. St. Mary's 4. Government Junior Boys' 5. Accra Royal 6. X'borg S.M. Senior 7. X'borg S.M. Junior 8. X'borg S.M. Infant 9. X'borg S.M. Kindergarten 10. Government Girls' School	M = 438 F = 196 Total 634	

INFANT WELFARE CLINIC.

Month.	New Cases.	Old Cases.	New Cases Attendances.	Old Cases Attendances.	Total Cases.	Total Attendances.
1928.						
April	253	262	346	310	515	656
May	205	245	306	343	450	649
June	294	284	492	467	578	959
July	334	390	571	605	724	1,176
August	381	358	597	569	739	1,166
September	561	510	912	707	1,071	1,619
October	492	533	783	801	1,025	1,584
November	503	487	870	970	990	1,840
December	353	320	573	537	673	1,110
January 1929.	473	258	713	416	731	1,129
February	412	324	601	462	736	1,063
March	369	328	544	487	697	1,031
Total	4,630	4,299	7,308	6,674	8,929	13,982

SCHOOL CHILDREN CLINIC.

Month.	New Cases.	Old Cases.	New Cases Attendances.	Old Cases Attendances.	Total Cases.	Total Attendances.
1928.						
April	54	96	60	126	150	186
May	22	110	33	195	132	228
June	55	122	73	247	177	320
July	7	33	7	68	40	75*
August	20	134	43	219	154	262
September	24	108	27	139	132	166
October	21	103	27	167	124	194
November	11	83	39	193	94	232
December	24	40	34	57	64	91
1929.						
January	8	15	9	19	23	28*
February	30	51	51	97	81	148
March	31	98	45	177	129	222
Total	307	993	448	1,704	1,300	2,152

*Schools closed.

ANTE-NATAL CLINIC.							GOVERNMENT MIDWIFE.			HOUSE-TO-HOUSE VISITS.			
Month.	New Cases.	Old Cases.	New Attendances.	Old Attendances.	Total Cases.	Total Attendances.	Visits.		Deliveries.	Lady Medical Officer.		Health Visitor.	Number of Lectures to Midwives.
1928.							1928.			1928.			
April	32	32	34	36	64	70	April ..	643	2	April	40	—	3
May	21	44	37	75	65	112	May ..	779	3	May	115	—	2
June	25	52	39	85	77	124	June ..	No	Midwife ..	June	119	—	2
July	19	33	28	47	52	75	July	No	Midwife ..	July	117	429	2
August	17	33	23	44	50	67	August ..	No	Midwife ..	August ..	119	430	2
September	43	34	74	55	77	129	September ..	30	—	September ..	117	—	2
October	27	50	40	68	77	108	October ..	420	—	October ..	—	—	2
November	30	24	48	38	54	86	November ..	530	1	November ..	20	—	2
December	21	7	38	14	28	52	December ..	—	—	December ..	50	—	—
1929.							1929.			1929.			
January	35	10	44	20	45	64	January ..	560	1	January ..	52	—	—
February	30	14	39	24	44	63	February ..	650	1 Attended but sent to Korli Bu.	February ..	55	—	2
March	24	39	28	62	63	90	March ..	450	2	March	30	121	—
Total	324	372	472	568	696	1,040		4,062	9		834	980	19

Wassermann Tests (5 months).

	Number of Tests.	Number Positive.
1928.		
November ..	11	2
December ..	18	7
1929.		
January ..	25	8
February ..	25	13
March ..	10	2
	89	32

SCHOOL MEDICAL INSPECTION.

Summary Sheet of conditions found on Examination.

Schools 10, *Number Examined* 634, *Period April,* 1928—*March,* 1929.

	Number.	%	
Vaccination :—			
Good	285		
Faint	89		
Nil	260		
Development :—			
Good	592		
Fair	42		
Poor	—		
Nutrition :—			
Good	468		
Fair	163		
Poor	3		
Skin Diseases :—			
Ringworm	28		Total .. .. 79 or 12.4%
Itch	51		
Others	—		
Glands enlarged :—			
Cervical	25		Total .. .. 100 or 0%
Submaxillary, Axillary and Tonsillar	49		
Groin	26		
Spleen :—			
Normal	504		Total .. .. 120 or 18.9%
+1	91		
+2	24		
+3	4		
+4	1		
Mouth :—			
Oral Sepsis	—		Total .. .. 1 or 0.1%
Other Diseases	1		
Teeth :—			
Sound	552		Total .. .. 82 or 12.9%
1–4 decayed	77		
4 or more decayed	5		
Nose and Throat :—			
Enlarged Tonsils	96		15.1%
Ear :—			
Discharge	7		Total .. .. 7 or 1.1%
Deafness	—		
Other Diseases	—		
Eye :—			
Conjunctivitis	10		Total .. .. 33 or 5.2%
Opacities, Bleph.	23		
Vision :—			
Good	618		
Fair	16		
Bad	—		
Heart :—			
Organic disease	8		Total .. .. 26 or 4.1%
Functional disease	18		
Blood :—			
Anaemia	—		
Lungs :—			
Bronchitis	4		Total .. .. 18 or 2.8%
Tuberculosis	9		
Other Diseases	5		
Tuberculosis :—			
Glandular	—		Total .. .. 0 or 0%
Bone and Joint	—		
Others	—		
Deformities :—			
Congenital	18		Total .. .. 65 or 10.2%
Acquired	47		
Yaws—Active	25		4.1%
V.D.—Passive	11		
Unclassified	—		

I. M. MALCOLM-AITKEN,

School Medical Officer.

10*th April,* 1929.

MEDICAL EXAMINATION OF SCHOOL CHILDREN.

RETURN OF SCHOOL CHILDREN EXAMINED FOR THE YEAR APRIL, 1928–MARCH, 1929.

Number examined—Boys 438, Girls 196 } Total 634

Number found defective—Boys 120, Girls 242 } Total .. 362

SUMMARY OF DEFECTS.

Month.	Number.	Male.	Female.	School.	Spleen.	Heart.	Lungs.	Debility.	Skin.	Mouth and Teeth.	Throat and Tonsils.	Ears.	Eyes.	Glands.	Nervous System.	Deformities.	Unvaccinated.	Yaws (Active).	Yaws (Passive).	Parasites.	Remarks.
1928.																					
April	26	—	26	Wesleyan Mission	6	2	—	—	8	1	3	—	1	9	—	5	17	—	2	—	
May	139	96	43	Wesleyan Mixed	37	8	5	—	11	36	7	6	2	3	—	4	65	5	—	1	
May	77	77	—	St. Mary's	14	1	—	—	6	2	20	—	—	10	—	6	19	1	—	—	
June	127	127	—	Government Junior Boys ..	19	5	—	—	25	22	7	—	6	7	—	12	83	10	—	—	
June	81	63	18	Royal School	5	6	1	—	7	4	5	—	6	3	—	11	16	4	1	—	
August	50	32	18	Royal School	1	1	1	—	6	4	6	—	—	13	—	4	7	2	—	—	
August	3	1	2	Wesleyan Mixed	2	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	
August	2	2	—	X'borg S.M. Senior ..	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	
August	1	—	1	X'borg S.M. Junior ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
August	4	4	—	X'borg S.M. Infant ..	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	
December ..	1	1	—	Government Boys	—	—	—	—	—	1	1	—	1	—	—	—	—	—	—	—	
December ..	6	—	6	Government Girls	—	—	—	—	—	1	3	—	1	1	—	—	1	—	—	—	
1929.																					
January ..	2	—	2	Government Girls	1	—	—	—	1	—	—	—	1	1	—	—	—	—	—	—	
January ..	1	1	—	Government Junior Boys ..	1	—	—	—	—	1	—	—	1	1	—	—	—	—	—	—	
February ..	7	—	7	Government Girls	2	1	—	—	1	2	7	—	2	1	—	1	1	—	—	—	
February ..	2	2	—	Government Junior Boys ..	1	1	—	—	—	—	1	1	1	—	—	—	1	—	—	—	
February ..	1	1	—	S.M. Kindergarten	1	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	
February ..	1	1	—	S.M. Junior	—	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	
February ..	1	1	—	Royal	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	
March	41	—	41	Government Girls Infant ..	17	2	5	3	6	1	17	—	2	18	1	—	36	—		18	
March	29	—	29	Government Girls Std. I–VII	6	1	4	3	—	3	9	—	8	9	—	8	5	—	2	5	
March	4	3	1	S.M. Infant X'borg ..	1	—	1	2	—	—	1	—	—	3	—	3	1	—	—	3	
March	7	5	2	S. M. Junior X'borg ..	2	—	—	—	1	—	3	—	—	6	—	3	1	—	1	3	
March	21	21	—	S.M. Senior X'borg ..	4	3	1	1	7	2	4	—	1	13	1	7	6	2	5	10	
Total ..	634	·438	196		120	31	18	9	79	82	96	7	33	100	2	65	260	25	11	40	

The summer vacation was in July. The list of new entrants was received in March, 1929. Previous list of unexamined children completed in August, 1928.

APPENDIX Q.

SANITATION BRANCH.

MOSQUITO PROOFING OF OFFICIALS QUARTERS 1928–29.

Province, etc.	Permanent Quarters.	Temporary Quarters.	Bush Quarters.	No. partly protected.	No. completely protected.
Accra	288	4	—	11	—
Eastern (other than Accra)	75	1	—	3	—
Central	40	12	2	2	3
Western	209	13	2	2	10
Ashanti	152	—	2	2	—
Northern Territories	39	—	22	10	—
Total	743	30	28	30	13

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